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PHASE II LOWER CONNECTICUT RIVER
COMBINED SEWER OVERFLOW STUDY
CSO MONITORING PLAN

March, 1986

[Massachusetts Division of Water Pollution Control]

METCALF & EDDY, INC. / ENGINEERS
BOSTON / NEW YORK / PALO ALTO / CHICAGO

M&E®

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April 4, 1986

J-1701

Mr. Michael Finn
Springfield Regional W.W.T.P.
1600 East Columbus Avenue
Springfield, MA 01103

Dear Mr. Finn:

In accordance with our Agreement dated December 23, 1985, we are pleased to submit the plan for the CSO monitoring program for the Lower Connecticut River CSO study. The monitorig program will consist of a combination of continuous recording flow meters and automatic samplers, supplemented by spot flow measurements and grab sampling. This plan provides a summary of the site selection process for continuous monitoring stations and a discussion of the continuous monitoring equiment.

This report addresses comments put forth as a result of the CAC meeting on March 18 and summarizes the final site selection process.

If you or others on the distribution list should have any questions regarding the report or monitoring program, please feel free to contact us.

Very truly yours,

David R. Bingham
Project Manager

DRB/fd

cc: P. Hogan
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CONNECTICUT RIVER CSO STUDY - CSO MONITORING PLAN

SECTION ONE

BACKGROUND AND OBJECTIVES

1.1 General

An investigation of the impacts of combined sewer overflows (CSOs) on the water quality of the lower Connecticut River is being conducted by Metcalf and Eddy for the City of Springfield and the Massachusetts Division of Water Pollution Control (MDWPC). The overall goal of the Connecticut River CSO study is to develop a cost-effective plan to reduce CSO loadings so that water quality standards and desired river uses are achieved. As part of this study, it is necessary to determine the quantity and quality of CSOs through mathematical analysis in conjunction with a field measurement and laboratory analysis program. The purpose of this report is to develop the basis of this monitoring program for CSO discharges.

1.2 Study Area Description

The study area for this project includes seven communities located within the Connecticut, Chicopee and Westfield River drainage basins. The study area communities include: Agawam, Chicopee, Holyoke, Ludlow, South Hadley, Springfield, and West Springfield. The locations of these communities are shown in Figure 1-1.

Table 1-1 presents background data for these communities. The study area communities can be broken into two basic classes

Table 1-1. Background Data on Study Area Communities

Community	Population[a]	Area (acres)	Number of CSOs[b]	Annual CSO Flow Estimate[b]	City Classification
Agawam	26,300	15,600	15	46	Residential
Chicopee	55,100	15,300	40	1981	Industrial
Holyoke	44,700	14,600	15	1118	Industrial
Ludlow	18,100	18,200	6	498	Residential
South Hadley	16,400	11,700	13	45	Residential
Springfield	152,300	21,100	26	1139	Industrial
W. Springfield	7,000	11,200	2	4	Residential

a) 1980 Census Report Estimates
b) from Phase I Report on the Lower Connecticut River Combined Sewer Overflows

based on land use, urban-industrial and residential. The industrial cities, Chicopee, Holyoke, and Springfield, have the highest and most dense populations and also have the greatest volume of CSO flow. In contrast, the residential communities tend to have less dense populations and fewer overflow sites.

The rivers in the study area include the Connecticut River from the South Hadley/Hadley town border to the Connecticut State Line; the Chicopee River from the Ludlow/Belchertown border to the Connecticut River; and the Westfield River from the Agawam/Westfield border to the Connecticut River. The locations of these rivers are presented in Figure 1-1.

Figure 1-1 (Bound in Back)

1.3 Monitoring Plan Objectives

The overall goal of the monitoring program is to quantify both the pollutant flows and loads from the CSOs which discharge into the receiving waters in the study area. This information will then be used in conjunction with analysis of the river system to develop a stormwater management model and determine the CSO load reduction required to meet desired river uses. The monitoring program as determined through previous scoping efforts will consist of a combination of continuous recording flow meters and automatic samplers, supplemented by spot flow measurements, grab sampling, and by available data. The main purpose of this report is to select sites for the continous monitoring stations.

Accurate CSO flow and load quantification requires the measurement of both quantity and quality of CSOs. Because of the large number of CSOs in the study area, the expense of monitoring, sampling and laboratory analysis of each overflow site is prohibitive. Therefore, the system analysis methodology must be based on monitoring and sampling at only a selected number of overflow sites. Since the number of overflow sites which can feasibly be monitored is limited, other objectives in developing this monitoring plan include maximizing the use of available data and collecting data which will be most representative of other areas which can not be monitored.

SECTION TWO

PRELIMINARY SITE SELECTION

2.1 Introduction

The monitoring site selection process was performed in three steps as follows: 1) monitoring sites were allocated to the different communities; 2) ranking criteria were developed for site selection; and 3) potential sites in each community were ranked according to selection criteria set forth in step 2. The result of this process was the compilation of a list of preliminary monitoring sites selected for further investigation.

Due to economic and funding constraints, the maximum number of continuous monitoring stations for the entire study area has been limited to ten. Therefore, ten final sites have been selected from this list in accordance with the community breakdown established in step 1) and the ranking criteria in step 2). These steps are described in the following paragraphs.

2.2 Monitoring Site Allocation

Several alternatives for allocating the ten sites among the seven different communities in the study area were investigated. The ranking of communities was based on five factors, each of which is important in the characterization of the combined sewer discharges. The five ranking categories are population density, percent of area served by the combined sewer system, the number of existing CSOs, the total estimated CSO discharge volume, and the un-metered CSO discharge volume.

The first of the ranking categories, population density, was used as an indication of both the quantity and the quality of the CSO discharges from each community. Areas of high population density are generally "city" environments which can be characterized as having large volumes of dirt, solids and pollutants in the runoff and also as having large volumes of runoff due to the high percentage of impervious area. This factor reflects both the quantity and the quality aspects of the discharges.

The next three ranking categories were used as an indication of the quantity of the CSO discharges from each community. Ranking of the communities by the percent of each area which is served by combined sewers was used as an indication of the quantity of CSO discharges from each community. The number of CSO discharge sites was also used to reflect the extent of combined sewer systems in each area. Ranking by total estimated annual CSO discharge volume was also used to reflect the relative quantity of discharges from the CSOs of each community.

The last of the ranking categories was developed in order to account for the use of existing flow measurement points in the analysis of each sewer system. Some of the pumping stations and all of the wastewater treatment plants in the study area are already equipped with flow metering devices. The flow meters at these stations measure the flow through the pumping station but not the overflow to the receiving waters. Thus, each of these metering stations would provide a truncated hydrograph of the storm discharges with the maximum flow equal to the pumping

capacity. Although this data would not quantify the total flow through the CSOs, it would be of use in the calibration of the stormwater runoff model for these areas. This final ranking category assigned a weight to each community based on the amount of flow for which there was no available data, which thereby gives an indication of the relative need for monitoring data within each community.

Table 2-1 presents a summary of the ranking and the resulting number of sites allocated to each community. An independant calculation was made for each ranking category. The weight according to each category was calculated as the percent of each total characteristic. For example, the weight for each community with respect to population density was calculated as the population density of each community divided by the total population density. This weight was then converted to a percentage of the ten monitoring sites. Final ranking was based on the average of the sum of all categories, thus giving equal weight to each ranking category. As is indicated in the table, the result was three monitoring stations in Chicopee and Springfield, two stations in Holyoke, and one each in Ludlow and Agawam.

Chicopee has three sites due to the large number of CSOs and the high estimated discharge volume, both metered and unmetered. Springfield has the same number of sites, mainly due to high population density as well as high estimated flows and number of CSOs. The City of Holyoke has two monitoring stations

TABLE 2-1. SUMMARY OF ALTERNATIVE RANKING FACTORS USED FOR THE ALLOCATION OF MONITORING STATIONS

Ranking Factor	Agawam	Chicopee	Holyoke	Ludlow	S. Hadley	Springfield	W. Springfield	Total
Population Density (people/acre)	1.7	3.6	3.1	1.0	1.4	7.2	2.4	20.4
Weight	0.08	0.18	0.15	0.05	0.07	0.35	0.12	
Number of Sites	0.8	1.8	1.5	0.5	0.7	3.5	1.2	
Percent Combined Sewer Area	0.8	33.6	18.3	6.2	2.4	19.7	0.6	
Weight	0.01	0.41	0.22	0.08	0.03	0.24	0.01	
Number of Sites	0.1	4.1	2.2	0.8	0.3	2.4	0.1	
Number of CSOs	15	40	15	6	13	27	2	118
Weight	0.13	0.34	0.13	0.05	0.11	0.23	0.02	
Number of Sites	1.3	3.4	1.3	0.5	1.1	2.3	0.2	
Annual CSO Flow Estimate(a) (mg/yr)	46	1981	1118	498	45	1139	4	4831
Weight	0.01	0.41	0.23	0.10	0.01	0.24	0.00	
Number of Sites	0.1	4.1	2.3	1.0	0.1	2.4	0.0	
Un-Metered CSO Flow(a) (mg/yr)	33	920	822	498	34	795	0	3102
Weight	0.01	0.30	0.26	0.16	0.01	0.26	0	
Number of Sites	0.1	3.0	2.6	1.6	0.1	2.6	0	
Composite Rank(b)	0.05	0.33	0.20	0.09	0.05	0.26	0.03	
Number of Sites	1	3	2	1	0	3	0	

a) From Phase I S/SWMM Analysis
b) Average of ranking schemes

due to the fewer number of overflow sites in this community. The final two stations were allocated to Ludlow and Agawam. The driving factor for the selection of Ludlow was the estimated volume of flow, more specifically the volume of un-metered flow. The Town of Agawam was selected due to the relatively large number of CSOs, the discharge volume and the geographic location of this community. It would be more desirable to have a station located on the Westfield River as compared to the selection of an additional monitoring station on the Connecticut River.

The other two communities did not receive a monitoring station for several reasons. South Hadley has both low population density and a low estimated volume of CSO discharge. West Springfield also has an extremely low CSO discharge volume and a small number of overflow sites relative to the entire study area. One reason for the low discharge volume is that the majority of population in these communities is served by separate storm sewer systems as is indicated by the percentage of area which is served by combined sewer systems.

2.3 Preliminary Site Selection Criteria

The next step in the site selection process was the development of criteria for determining specific CSO monitoring stations within each community. The criteria for site selection address two basic concerns, the measurement of the quality of the CSO discharges and the measurement of the quantity of the discharges. From a quality standpoint, it is most important to

monitor drainage areas with uniform characteristics. In this way, it is possible to select basins representative of the different land use patterns in the study area so that the data generated from monitoring can be extrapolated to the un-monitored areas of the system. From a quantity standpoint, it is desirable to monitor the overflows with the greatest volume of discharge. The problem with the selection of monitoring sites based solely on the quantity of flows is that this method does not provide a means of extrapolating the runoff generating characteristics of the tributary area to similar un-monitored areas of the system. Due to the economic limitation on the number of monitoring stations, emphasis was placed on the ability to utilize data from the monitored areas for the characterization of the discharges from the entire system. As a result, the "quality" criteria were used for the initial screening of sites which were then ranked according to "quantity".

Following a review of similar previously conducted studies (EPA, 1980; EPA, 1977; Metcalf & Eddy, 1980; NTIS, 1983; Jewell et al., 1981) the following quantity and quality criteria for initial basin selection and screening were set forth:

- Tributary areas which discharge via a single conduit
- Uniform and representative land use pattern
- Reasonable sized drainage areas (>20 acres)
- Areas with existing metering equipment
- Basins of significance relative to overall CSO flows in the study area

Monitoring of tributary areas which discharge via a single conduit is important as it insures that the data collected reflect the total flow and load generated in the tributary area. Systems with multiple upstream and in-system overflows preclude this possibility. The second criterion insures the ability to relate the runoff quality to characteristic land use patterns thereby providing the ability to estimate CSO loads from un-monitored areas of the system.

The size of a drainage area is important from both a quantity and a quality standpoint. The size of the drainage area affects the relative importance of runoff flow and also affects the ability to accurately characterize the relationship between the drainage area and runoff flow. Very small catchments should be avoided as the very rapid response time may make runoff characterization difficult. Very large areas must be avoided if land use in the area is not uniform. Also, such large drainage areas tend to have multiple overflows.

The next criterion insures the use of data from existing metering points such as pumping stations and wastewater treatment plants. As stated previously, the flow meters at these stations do not quantify the entire stormwater discharge but do provide a useful means of calibrating the stormwater runoff model in these areas. Metered pumping stations quantify only the flow being pumped into the interceptor lines. The monitoring stations quantify only the overflowing volume. By selecting metered pumping stations as monitoring stations, it is possible to quantify the

total flow from an area. This criterion insures the use of existing flow metering points to completely quantify the flow when possible.

The final criterion was developed exclusively from a quantity standpoint. This criterion insures the selection of CSO drainage basins with large flows relative to the entire system when possible. As one of the goals of the program is to quantify flows, it is desirable to monitor CSOs which have a significant amount of flow relative to the total volume.

2.4 Preliminary Screening Process

The first step in basin selection was the characterization of each basin by the following physical characteristics: size, present land use pattern; drainage type; presence of upstream overflows; ground slope and soil characteristics. This information was taken largely from data collected for the Phase I report and supplemented with ongoing sewer systems inspections. The selection criteria were then used to screen the list of potential monitoring sites.

In each community, the majority of the overflow sites are tied directly into the main interceptors and therefore discharges consist of overflow from the interceptor as well as from the direct tributary area. Due to the multiple overflow sites located upstream of such inteceptor related overflows, these sites were screened from further consideration. The sites which passed the initial screening process and the anticipated approach for the modeling of each monitored community are discussed in the

following paragraphs of this section. Tables are presented for each community which group the acceptable sites by land use category. The general location of each site in the community was also provided to insure even distribution of monitoring sites within each community. Following this discussion of the monitored communities, the anticipated approach for the modeling of the un-monitored communities is discussed.

Springfield. The City of Springfield has a large percentage of the sewered area served by combined sewers. The system is divided along three main interceptor sub-systems, the Ludlow Interceptor, the Mill River (Main) Interceptor, and the Connecticut River Interceptor. There are only three pumping stations in the area, one on the Ludlow Interceptor, and two on the Connecticut River Interceptor. None of these stations are equipped with flow meters. Figure 1-1 presents the locations of these interceptors, pumping stations and CSOs. As can be seen from this figure, the majority of the overflow sites are tied directly into the interceptors and therefore do not satisfy the screening criteria. Only nine of the twenty-seven CSOs in the area complied with the single conduit criterion.

Table 2-2 provides the characteristic data on these nine CSOs and their drainage subareas. A preliminary site selection approach was developed, assuming that all nine of these sites are accessible and compatible with the equipment. According to

TABLE 2-2. RESULTS OF PRELIMINARY SCREENING - CITY OF SPRINGFIELD

Location	CSO #	Drainage Area #	Area (acres)	Estimated Annual Flow (mg/yr)	Primary Land Use	Secondary Land Use	Geographic Area
Clinton St.	010	3	308	4	Med-Hi Res.	Ind-Bus.	Conn. R.
Worthington St.	012	4 + 5	750	530	Med-Hi Res.	Ind-Bus.	Conn. R.
Elm St.	014	6	110	55	Med-Hi Res.	Ind-Bus.	Conn. R.
Washburn St.	008	2	282	102	Med-Hi Res.	Ind-Bus.	Conn. R.
Rowland St.	007	1	310	54	Med-Hi Res.	Ind-Bus.	Conn. R.
Mill,Orange,Locust St.	019	14	508	35	Med. Res.		Mill R.
Allen, Oakland St.	025	13	78	0	Med. Res.		Mill R.
Central St.	024	10	42	1	Med. Res.	Forest	Mill R.
Banner St.	043	23	108	22	Low-Med Res.	Forest	Indian O.

this plan, monitoring sites could be selected to cover the range of geographic areas in Springfield as well as the different land use patterns. The following CSOs would be selected for monitoring: the Washburn Street CSO (#008), the Banner Street CSO (#043) and the Mill, Orange and Locust Street CSO (#019). The Washburn Street CSO would be representative of similar areas along the Connecticut River which have high density residences with mixed developments of industry and business. The Banner Street CSO would characterize the less dense residential areas which are found along the perimeter of Springfield. The intermediate areas which have medium density residences without significant amounts of industry or business would be represented by the Mill, Orange and Locust Street CSO on the Mill River.

The area along the Connecticut River in Springfield contains numerous industrial parks which may cause highly variable quality in the CSO discharges from this area. Due to concern in predicting the quality of the flow from this area, it may be desirable to place two of the monitoring stations in the industrialized area along the Connecticut River. Final site selction will be based on further assesment of potential monitoring sites along this interceptor, and on detailed site inspections.

Chicopee. The City of Chicopee has the largest percentage of land served by combined sewers and the largest number of overflow sites. The City is served by two main interceptor subsystems, the Connecticut River Interceptor and the Chicopee River Interceptor. There are 13 pumping stations; five on the Connecticut River Interceptor and seven on the Chicopee River Interceptor. Figure 1-1 presents the locations of these interceptors, pumping stations and CSOs. Only eight of the forty CSOs in the area satisfy the single conduit criterion.

Table 2-3 provides the characteristic data on these eight CSOs and their drainage basins. Several of these would be more favorable for monitoring as they are equipped with metered pumping stations. Assuming that all eight of these sites are accessible and compatible with the equipment, a preliminary site selection approach was developed. According to this plan, the following CSOs would be selected for monitoring: the Jones Ferry Road Pumping Station CSO (#008), the Poland Road Pumping Station CSO (#021) and the Granby Road CSO (#025). CSO# 008 would provide complete quantification of the flow from its tributary area as this station is equipped with a flow meter in the pumping station. The Poland Road pumping station is an ejector station. It is also possible to estimate the interceptor flow from this station through the record of the number of ejections over time. The Jones Ferry Road CSO and Pumping Station would be useful in characterizing the flow from comparable downtown areas with high to medium density residences intermixed with industries

TABLE 2-3. RESULTS OF PRELIMINARY SCREENING - CITY OF CHICOPEE

Location	CSO #	Drainage Area #	Area (acres)	Estimated Annual Flow (mg/yr)	Primary Land Use	Secondary Land Use	Geographic Area
Jones Ferry Road PS	008	7	544	168	Med-Hi Res.	Bus-Ind.	Conn. R.
Call St. PS	006	6	323	164	Med-Hi Res.	Bus.	Conn. R.
Chicopee Electric	031 III	20	289	96	Med-Low Res.	Bus.	Chicopee R.
Poland Road	021	12	58	32	Med-Low Res.	Bus.	Chicopee R.
Britton St.	001	1	337	109	Med-Low Res.	Forest	Conn. R.
Leslie St. PS	005	5	97	26	Med-Low Res.	Forest	Conn. R.
Granby Rd.	025	14	99	21	Med-Low Res.	Forest	Chicopee R.
E. Main/Eton St.	038	19	20	6	Med-Low Res.	Forest	Chicopee R.

and businesses. The Poland Road CSO would be representative of the less dense downtown residential areas which have scattered industries and businesses as well. The low density wooded residential areas would be characterized by the Granby Road CSO.

This selection of sites covers representative land use categories in Chicopee and also distributes the sites evenly over the area. Based on the data from these three sites, the flow meters at the other metered pumping stations and at the Chicopee wastewater treatment plant, it will be possible to characterize the un-monitored overflows from the Chicopee area. The final site selections will be made following detailed site inspections. Comparable sites will be selected from Table 2-3 in the case that the above mentioned sites prove either inaccessible or incompatible with the monitoring equipment.

Holyoke. The City of Holyoke has a relatively high population density centered over a relatively small area which is served by combined sewers. The combined sewer system has eight pumping stations distributed within the three main interceptor sub-systems as follows: two in the Day Brook/Front Street Interceptor sub-system, three in the North Interceptor sub-system, and two in the South Interceptor sub-system. Figure 1-1 presents the locations of these interceptors, pumping stations and CSOs. Most of the CSOs feed directly into the main interceptors thereby limiting the number of overflows which satisfy the initial selection criterion.

Table 2-4 presents data on the five CSOs which discharge via a single conduit. The Mosher Street Pumping Station (#014) and the Jones Ferry Road Pumping Station (#003) would be most favorable for monitoring as they contain existing metering equipment which would allow for the quantification of the flow into the interceptor as well as into the overflow. The Mosher Street CSO discharge would be representative of the high density downtown areas with mixed residences and businesses while the Jones Ferry Road CSO discharge would be representative of the more suburban areas with low density residences, forest and some agriculture. Final site selection will be made following site inspections. Alternate sites will be selected from Table 2-4 in the case that the above mentioned sites prove either inaccessible or incompatible with the monitoring equipment.

Ludlow and Agawam. The communities of Ludlow and Agawam will each have one monitoring station. Both communities have relatively limited areas which are served by combined sewer systems. Figure 1-1 presents the locations of the major interceptors, pumping stations and CSOs in these two communities. Only two of the CSOs from each community were isolated so that they discharge through a single conduit.

Table 2-5 presents data on the four CSOs from Ludlow and Agawam. In Agawam, the Ottawa Street CSO (#009) would be more favorable for monitoring as it has a more reasonable sized drainage area as compared to the Suffield Street CSO. Assuming that this site was selected, the State Street and Franklin Street

TABLE 2-4. RESULTS OF PRELIMINARY SCREENING - CITY OF HOLYOKE

Location	CSO #	Drainage Area #	Area (acres)	Estimated Annual Flow (mg/yr)	Primary Land Use	Secondary Land Use	Geographic Area
Mosher St. PS	014	10	156	59	Med-Hi Res.	Bus-Ind.	N. Canal
Yale St.	019	4	39	10	Med-Hi Res.		Highland Pk.
River Terrace	021	1	266	110	Med-Low Res.	Forest	Highland Pk.
Providence Hospital	002	15	35	3	Low Res.	Agr.Forest	S. Holyoke
Jones Ferry Road PS	003	14	41	1	Low Res.	Agr.Forest	S. Holyoke

TABLE 2-5. RESULTS OF PRELIMINARY SCREENING - TOWNS OF LUDLOW AND AGAWAM

Location	CSO #	Drainage Area #	Area (acres)	Estimated Annual Flow (mg/yr)	Primary Land Use	Secondary Land Use	Geographic Area
State, Franklin St.	010	5	85	13	Low Res.	Agr.	Ludlow
State, East St.	008	6	23	9	Med Res.	Bus-Ind.	Ludlow
Ottawa St.	009	1	75	17	Med Res.	Bus-Ind.	Agawam
Suffield St.	015	3	20	10	Med Res.	Bus-Ind.	Agawam

CSO (#010) in Ludlow would be selected in order to compliment the land use coverage from Agawam. In this way, the Ottawa Street CSO from Agawam would be used to represent areas which are characterized by medium density residences with scattered businesses and industries. The State and Franklin Street CSO would be used to represent the more remote areas with low density residences, forest and open agricultural land.

This selection of sites covers the two most typical land use categories found in the residential communities of Ludlow and Agawam. Based on the data from these two sites as well as the metered pumping stations in Agawam and the flow metering at the Bondi Island WWTP, it would be possible to characterize the flow from the un-monitored CSOs in these two communities. In the case that the above mentioned sites prove to be either inaccessible or incompatible with the monitoring equipment, alternate sites will be selected.

South Hadley and West Springfield. The two communities of South Hadley and West Springfield were not selected for monitoring since both communities have a very limited area served by the combined sewer system. As a result, these communities have fewer overflow sites and much lower estimated overflow volume.

The town of South Hadley has thirteen overflows, two of which are emergency bypasses for small pumping stations. About half of the overflows in South Hadley are scattered within the separated sewer system and discharge to small inland tributaries to the Connecticut River. The other half of the CSOs are located

along the Connecticut River Interceptor. There are two metered pumping stations as well as a flow metering station at the South Hadley wastewater treatment plant to assist in quantifying flows for this area. The combined sewer areas in South Hadley are primarily medium to low density residential districts with varying amounts of forest and open land. Runoff parameters for these areas will be extrapolated from similar monitored areas.

The town of West Springfield has only four small areas served by combined sewers with only two active CSOs. The community is served by two main interceptor sub-systems which transport the sewage to the Bondi Island WWTP. There are six metered pumping stations located along these two interceptors as well as the meter at the Bondi Island WWTP for the calibration of the flow from this community. The tributary areas to the active CSOs in West Springfield are characterized by industries and businesses with scattered residences. Runoff parameters for this area will be extrapolated from the similar monitored areas.

Given these flow metering points and the ability to extrapolate runoff parameters from comparable monitored basins in other communities of the study area, it will be possible to characterize the flow from South Hadley and West Springfield.

SECTION THREE

MONITORING EQUIPMENT, INSTALLATION AND MAINTENANCE

3.1 General

Monitoring equipment, installation, and maintenance for the Spring 1986 CSO Monitoring Program will be provided by Scan-N-Seal Environmental Services, Inc. Scan-N-Seal is under contract to Metcalf & Eddy to perform the following services as part of this monitoring program:

A. Install, monitor, and maintain one flow monitoring device capable of obtaining depth of flow and velocity continuously at each of the ten sub-areas with one spare monitor for a total of eleven monitoring devices.

   Each monitor shall be maintained in place for the period of eight weeks.

B. Install, sample, and maintain one automatic sampling device at each of the ten sub-areas with one spare sampler for total of eleven samplers.

   Each sampling device shall be maintained in place for the period of eight weeks.

C. Install and maintain five rain gauges at those locations designated by Metcalf & Eddy for a period of eight weeks.

This section of the report provides descriptions of the monitoring and sampling equipment, and the installation and maintenance procedures to be followed throughout the study period.

3.2 Flow Monitoring Equipment

The WDFM-8, System 8 Flowlogger™ made by Montedoro-Whitney Inc. will be used to meter the overflow rate throughout the eight week program duration. The WDFM-8 Flowlogger™ is a compact, battery operated depth and velocity logger. The logger is well suited for sewer flow monitoring as it is equipped with a bi-directional velocity sensor which insures accurate flow measurement even under surcharge conditions. The logging device automatically records the depth and velocity of flow to a solid state 32K RAM memory chip at a pre-selected interval which may vary from every minute to once every twenty-four hours. Information on this equipment is contained in Appendix C.

The Flowlogger™ will be used with the Montedoro-Whitney DLP-2 interogator/reporter for on site-flow readout and data collection. This device provides the ability to upload the data in the field directly from the Flowlogger™ to a portable computer for data reduction. The WDFM-8 Flowlogger™ can be fitted to virtually any overflow pipe of constant diameter and slope with minimal installation effort. As previously stated, Scan-N-Seal will be responsible for the preparation of the monitoring stations, and the installation and maintenance of the equipment over the course of the monitoring program. A description of the installation and maintenance procedures to be followed by Scan-N-Seal is provided in Appendix B which defines the Quality Assurance/Quality Control Plan for the entire monitoring program.

3.3 Automatic Sampling Equipment

The American Sigma Model 6201 Portable Sampler has been selected for the collection of CSO samples at the selected monitoring sites. This sampler is a portable, automatic, programmable, battery-operated sampling device. It is well suited for CSO monitoring due to its small size and ease for programming, sample collection and maintenance. Information on this sampler is contained in Appendix C.

The sampler passes through any 20-inch diameter opening and requires minimal construction for placement. The Model 6201 sampler may be programmed to allow adjustments to sample interval and/or volume. This feature allows the frequency of the sampling to be adjusted to span the anticipated duration of each storm event. The sampler also has the capability to collect either discrete or composite samples. Depending on the physical characteristics of each site, the samplers will either be manually activated or activated by a depth of flow sensing switch.

Scan-N-Seal will be responsible for the installation and maintenance of the automatic samplers throughout the program. Metcalf & Eddy will assist with sample collection and delivery during storm events. The details for the procedures to be followed by all parties are described in Appendix B which defines the Quality Assurance/Quality Control Plan for this monitoring program.

3.4 Rain Gauging Equipment

Five tipping bucket rain gauges will be installed by Scan-N-Seal on the roofs of selected buildings located in close proximity to the CSO monitoring sites. Metcalf & Eddy will secure the approval for the installation and maintenance of the equipment with public officials as required. The location of the five rain gauging stations and the procedures to be followed for maintaining these stations is presented in Appendix B, the Quality Assurance/Quality Control Program.

The tipping bucket rain gauge records rainfall continuously in 0.01 inch increments. The data is recorded on a quartz clock driven recorder which contains a seven day rain chart. Following installation, Scan-N-Seal will be responsible for maintaining the gauges and changing the charts at least once every seven days.

SECTION FOUR

FINAL SITE SCREENING

4.1 General

Preliminary sites were selected in Section Two of this report as a result of the preliminary screening process. These sites were selected for further investigation based on field inspections to determine the accessibility of each site and compatibility with the monitoring equipment.

Table 4-1 presents characteristic data on the sites selected during the preliminary screening process. As explained in Section Two, monitoring stations were to be distributed throughout the study area with three stations in both Chicopee and Springfield, two stations in Holyoke and one each in Ludlow and Agawam. In the final screening process, monitoring stations have been selected to cover the different land use categories.

4.2 Supplemental Screening Criteria

A list of supplementary criteria were developed to further screen the potential sites based on details determined in the field inspections. These criteria address two basic concerns, the safety and accessibility of the monitoring stations, and the hydraulic compatibility with the monitoring equipment.

The following criteria were developed to insure the selection of safe, accessible sites which are compatible with the monitoring equipment:

TABLE 4-1. RESULTS OF PRELIMINARY SCREENING

Community	Location	CSO #	Drainage Area #	Area (acres)	Estimated Annual Flow (mg/yr)	Primary Land Use	Secondary Land Use	Geographic Area
Springfield	Clinton St.	010	3	308	4	Med-Hi Res.	Ind-Bus.	Conn. R.
	Worthington St.	012	4 & 5	750	530	Med-Hi Res.	Ind-Bus.	Conn. R.
	Elm St.	014	6	110	55	Med-Hi Res.	Ind-Bus.	Conn. R.
	Washburn St.	008	2	282	102	Med-Hi Res.	Ind-Bus.	Conn. R.
	Rowland St.	007	1	310	54	Med-Hi-Res.	Ind-Bus.	Conn. R.
	Mill, Orange, Locust	019	14	508	35	Med. Res.		Mill R.
	Allen, Oakland St.	025	13	78	0	Med. Res.		Mill R.
	Central St.	024	10	42	1	Med. Res.	Forest	Mill R.
	Banner St.	043	23	108	22	Low-Med Res.	Forest	Indian O.
Chicopee	Jones Ferry Road PS	008	7	544	168	Med-Hi-Res.	Bus-Ind.	Conn. R.
	Call St. PS	006	6	323	164	Med-Hi Res.	Bus.	Conn. R.
	Chicopee Electric	031 III	20	289	96	Med-Low Res.	Bus.	Chicopee R.
	Poland Road	021	12	58	32	Med-Low Res.	Bus.	Chicopee R.
	Britton St.	001	1	337	109	Med-Low Res.	Forest	Conn. R.
	Leslie St. PS	005	5	97	26	Med-Low Res.	Forest	Conn. R.
	Granby Rd.	025	14	99	21	Med-Low Res.	Forest	Chicopee R.
	E. Main/Eton St.	038	19	20	6	Med-Low Res.	Forest	Chicopee R.
Holyoke	Mosher St. PS	014	10	156	59	Med-Hi-Res.	Bus-Ind.	N. Canal
	Yale St.	019	4	39	10	Med-Hi-Res.		Highlnd Pk.
	River Terrace	021	1	266	110	Med-Low Res.	Forest	Highlnd Pk.
	Providence Hospital	002	15	35	3	Low Res.	Agr. Forest	S. Holyoke
	Jones Ferry Road PS	003	14	41	1	Low Res.	Agr. Forest	S. Holyoke
Ludlow	State, Franklin St.	010	5	85	13	Low Res.	Agr.	Ludlow
	State, East St.	008	6	23	9	Med Res.	Bus-Ind.	Ludlow
Agawam	Ottawa St.	009	1	75	17	Med Res.	Bus-Ind.	Agawam
	Suffield St.	015	3	20	10	Med Res.	Bus-Ind.	Agawam

- CSOs accessible through shallow (<30 ft) manholes
- manholes which require minimal traffic control for entrance
- CSOs with constant invert slope and diameter at the monitoring manhole

These criteria were used during site inspections to screen the sites selected through the preliminary screening process.

4.3 Field Inspections

Metcalf & Eddy has completed the field inspections of all overflow sites selected as a result of the preliminary screening process. The manhole and regulator inspection forms are presented in Appendix A. The notes from these field inspections will be discussed in the following paragraphs and final monitoring stations selected. The sites selected for monitoring during the final screening process have also been inspected by Scan-N-Seal in conjuction with Metcalf & Eddy to to insure compatibility with the monitoring equipment.

Springfield. A total of nine sites were selected as a result of the preliminary screening process for Springfield. Table 4-2 presents a summary of the notes from the site inspections. The following paragraphs summarize the basis for the selection of the final monitoring stations.

The first five CSOs in Table 4-2 are representative of the highly industrialized areas along the Connecticut River in Springfield. Following site inspections and meetings with community officials, it was decided that two stations would be

TABLE 4-2. SUMMARY OF FIELD INSPECTION NOTES - CITY OF SPRINGFIELD

LOCATION	CSO #	DIAMETER	SHAPE	TRAFFIC	DEPTH TO INVERT
Clinton Street	010	4'10" x 7'3"	EGG SHAPE	OFF ROAD	15 FT.
Worthington Street	012	5'7" x 7'0"	EGG SHAPE	OFF ROAD	15 FT.
Elm Street	014	60"	CIRCULAR	HEAVY TRAFFIC	
Washburn Street	008	6'6"	BOX CULVERT	LIGHT, SIDE ST.	17 FT.
Rowland Street	007	6'6"	BOX CULVERT	LIGHT, SIDE ST	20 FT.
Mill, Orange, Locust Street	019	30" x 54"	RECT. CULVERT	ISLAND	12 FT.
Allen, Oakland Street	025	24"	CIRCULAR	MEDIUM TRAFFIC	5 FT.
Central Street	024	24" x 36"	EGG SHAPE	MEDIUM TRAFFIC	8 FT.
Banner Street	043	42"	CIRCULAR	LIGHT TRAFFIC	12 FT.

selected from this land use class in Springfield in order to characterize the variable quality from the industrial discharges. The first two CSOs are relatively difficult to access as they do not have manholes located above the regulating weirs. These CSOs must be accessed through manholes located at the mouths of the outfalls as they discharge to the river. In order to provide access to the equipment during storm events, the equipment would have to be mounted in the mouth of the discharge pipes. This placement would increase the potential for vandalism. Site inspections indicated that the Clinton Street CSO would be prone to vandalism while the Worthington Street CSO would be relatively safe and also compatible with the equipment. The Elm Street CSO is also difficult to access as it is entered through a manhole located in a busy intersection. This site has a lower estimated overflow volume as compared to the Worthington Street CSO. The position of the backwater gate adjacent to the weir at the Elm Street CSO makes this station more difficult for monitoring. The following two CSOs, #008 and 007, are located on side streets with light traffic and discharge through 6' 6" box culverts which would be compatible with the monitoring equipment. The Washburn Street CSO would be more favorable for monitoring as it was estimated as having nearly twice the overflow volume of the Rowland Street CSO in the Phase I Report. As a result, the Worthington Street and Washburn Street CSOs were selected as the two final monitoring stations to characterize the industrialized areas of the system.

The remaining CSOs are characteristic of the medium to light density residential areas. The Mill, Orange, and Locust Street CSO would be the safest to access as it is located on an island in the street. This CSO discharges into a rectangular culvert which slopes down into a circular overflow pipe. The slope of the culvert makes this site less suitable for monitoring. CSOs #025 and 024 are located in relatively busy streets and also have a very low estimated overflow volume which makes them less favorable for monitoring. The Banner Street CSO is accessed through a shallow manhole located in a less traveled section of the street. The CSO discharges pass through a 42" circular overflow pipe which would be compatible with the monitoring equipment. As this site proved to be both safe and easy to access, it was selected as the final monitoring station from this land use class.

Chicopee. A total of eight CSOs were selected as a result of the preliminary screening process for Chicopee. Table 4-3 presents a summary of the notes from the site inspections. The following paragraphs summarize the basis for the selection of the final monitoring stations.

The first two CSOs (#'s 008 and 006) are representative of the medium to high density residential areas mixed with industry and business. Both of these CSOs would be safe for monitoring as they are accessed through manholes located in pumping station parking lots. The Jones Ferry Road CSO is accessed through an extremely heavy manhole cover, is slightly deeper and more

TABLE 4-3. SUMMARY OF FIELD INSPECTION NOTES - CITY OF CHICOPEE

LOCATION	CSO #	DIAMETER	SHAPE	TRAFFIC	DEPTH TO INVERT
Jones Ferry Road PS	008	48"	CIRCULAR	PARKING LOT	25 FT.
Call Street PS	006	60"	CIRCULAR	PARKING LOT	22 FT.
Chicopee Electric	031 III	48"	CIRCULAR	PARKING LOT	10 FT.
Poland Road	021	20"	CIRCULAR	PRIVATE ROAD	12 FT.
Britton Street	001	30"	CIRCULAR	LIGHT TRAFFIC	8 FT.
Leslie Street PS	005	36"	CIRCULAR	PARKING LOT	20 FT.
Granby Road	025	34"	CIRCULAR	MEDIUM TRAFFIC	6 FT.
E. Main/Eton Street	038	21"	CIRCULAR	LIGHT TRAFFIC	10 FT.

difficult to enter then the Call Street CSO. As a result, the Call Street Pumping Station CSO was selected as the representative monitoring station from this land use category.

The Chicopee Electric and Poland Road CSOs (#'s 031 III and 021) are representative of the medium density residential areas with scattered small businesses. Both of these CSOs would be safe, easy to access, and compatible with the monitoring equipment. The exact location of the overflow regulator to the Chicopee Electric CSO could not be located by town personnel at the time of inspection. As a result, the Poland Road CSO was selected as the representative monitoring station from this land use category.

The next four CSOs are representative of the medium to low density residential areas with small forests and open land. In the field inspections, all of these sites were found to be safe, easy to access, and compatible with the monitoring equipment. The Britton Street CSO is accessed through a shallow manhole on the side of a residential street with light traffic. The tributary area to this CSO is extremely large and has less uniform land usage as compared to the other CSOs in this land use category. As a result, this CSO would be less favorable for monitoring. The Leslie Street CSO was removed from consideration as it serves the area directly adjacent to the Call Street CSO which was also to be monitored. Of the two CSOs on the Chicopee River, the Granby Road CSO is more favorable for monitoring due to the greater size of its tributary area and the greater

estimated flow volume. The Granby Road CSO was therefore selected as the representative monitoring station from this land use class.

Holyoke. Five CSOs were selected as a result of the preliminary screening process for Holyoke. Table 4-4 presents a summary of the notes from the site inspections. The CSOs from each land use category have been compared and monitoring stations selected based on the results of the site inspections.

The Mosher Street Pumping Station CSO is the only CSO representative of downtown areas with medium to high density residences intermixed with business and industry. This CSO is accessed through a rectangular access cover in the pumping station parking lot. Although relatively deep, this CSO would be ideal for monitoring as it contains a metal grating to hold the equipment.

The Yale Street CSO is representative of the medium to high density residential areas adjacent to downtown which do not contain significant amounts of business and industry. This CSO is also safe to access as it is located in a gully off the road. The CSO discharges pass over a leaping weir and into an adjacent chamber where the monitoring equipment could be located. However, due to the way in which the flow enters the chamber, access to the monitoring equipment would be restricted. As a result, the Mosher Street Pumping Station CSO was selected as the representative monitoring station for the high density residential areas.

TABLE 4-4. SUMMARY OF FIELD INSPECTION NOTES - CITY OF HOLYOKE

LOCATION	CSO #	DIAMETER	SHAPE	TRAFFIC	DEPTH TO INVERT
Mosher Street PS	014	60"	CIRCULAR	PARKING LOT	25 FT.
Yale Street	019	10"	CIRCULAR	GULLY OFF ROAD	15 FT.
River Terrace	021		OPEN CHANNEL	OFF ROAD	
Prividence Hospital	002	24"	CIRCULAR	OFF ROAD	15 FT.
Jones Ferry Road PS	003	24"	CIRCULAR	HEAVY TRAFFIC	10 FT.

The next three CSOs are representative of the lower density residential areas. The River Terrace CSO was immediately eliminated from further consideration as it discharges directly into an open channel which would be incompatible with the monitoring equipment. Both the Providence Hospital and Jones Ferry Road CSOs would be compatible with the monitoring equipment. The Providence Hospital CSO is accessed through a manhole located in a gully off of a hospital access road. In contrast, the Jones Ferry Road Pumping Station CSO is accessed through a manhole which is positioned in the center of a relatively busy intersection. Due to this safer location, the Providence Hospital CSO was selected as the monitoring station from this land use class.

Ludlow and Agawam. The communities of Ludlow and Agawam were each allocated one monitoring station. Only two CSOs from each community were selected as a result of the preliminary screening process. Table 4-5 provides a summary of the field inspections notes.

In Ludlow, the two CSOs represent different land use categories. The State and Franklin Street CSO is representative of the low density residential areas while the State and East Street CSO is more representative of the medium to high density residential areas intermixed with business and industry. Field investigations have indicated that the State and East Street CSO would not be compatible with the monitoring equipment due to the extremely small size of the discharge pipe. The State and

TABLE 4-5. SUMMARY OF FIELD INSPECTION NOTES - TOWNS OF LUDLOW & AGAWAM

LOCATION	CSO #	DIAMETER	SHAPE	TRAFFIC	DEPTH TO INVERT
State, Franklin Street	010	18"	CIRCULAR	MEDIUM TRAFFIC	10 FT.
State, East Street	008	6"	CIRCULAR	LIGHT TRAFFIC	4 FT.
Ottawa Street	009	15"	CIRCULAR	OFF ROAD	8 FT.
Suffield Street	015	18"	CIRCULAR	HEAVY TRAFFIC	9 FT.

Franklin Street CSO was therefore selected as the monitoring station for this community. The State and Franklin Street CSO is accessed through a relatively shallow manhole on a street with a moderate traffic. The CSO and discharges pass through an 18" sloped circular discharge pipe which is compatible with the monitoring equipment.

In Agawam, both CSOs are representative of the medium to high density residential areas which contain scattered industries and businesses. Field investigations indicated that both CSOs would be safe to access and compatible with the monitoring equipment. The Ottawa Street CSO would be more favorable as it is accessed through an off-street manhole as compared to the Suffield Street CSO which is accessed through a manhole positioned in the center of a busy intersection. The Ottawa Street CSO also has a larger drainage area and a larger estimated overflow volume. As a result, the Ottawa Street CSO was selected as the monitoring station for this community.

4.4 Summary

A total of ten monitoring stations have been selected to characterize the CSO discharges from the entire study area. This report has provided the basis for the development of the continuous monitoring program and the selection of the ten continuous monitoring stations.

Table 4-6 presents the locations and physical characteristics of the ten CSO monitoring stations selected during the final inspection and screening process. As is indicated in this table, the monitoring stations have been

TABLE 4-6. PHYSICAL CHARACTERISTICS OF CSO MONITORING STATIONS

CSO Name	CSO #	Location	Receiving Water	Diameter	Shape	Depth to Invert
Washington Street	012	Springfield	Connecticut R.	5'7" x 6'7"	Egg Shape	15 ft.
Washburn Street	008	Springfield	Connecticut R.	6'6"	Box Culv.	17 ft.
Banner Street	043	Springfield	Chicopee R.	42"	Circular	12 ft.
Call Street PS	006	Chicopee	Connecticut R.	60"	Circular	22 ft.
Poland Road	021	Chicopee	Chicopee R.	20"	Circular	12 ft.
Granby Road	025	Chicopee	Chicopee R.	24"	Circular	6 ft.
Mosher Street PS	014	Holyoke	Connecticut R.	60"	Circular	25 ft.
Providence Hospital	002	Holyoke	Connecticut R.	24"	Circular	15 ft.
State, Franklin Streets	010	Ludlow	Chicopee R.	18"	Circular	10 ft.
Ottawa Street	009	Agawam	Westfield R.	15"	Circular	8 ft.

distributed with three stations in both Chicopee and Springfield, two stations in Holyoke, and one in both Ludlow and Agawam. The monitoring stations represent the full spectrum of land use categories and also the different rivers and geographical areas of the study area. This selection of stations will provide not only a record of the quantity and quality of the discharges from the monitored areas but also a means of predicting the quantity and quality of the discharges from the un-monitored areas.

REFERENCES

EPA, Methodology for Evaluating the Impact and Abatement of Combined Sewer Overflows; A Case Study of Onandaga Lake, EPA-600.

EPA, Nationwide Evaluation of Combined Sewer Overflow and Urban Stormwater Discharges, Vol. III: Characterization of Discharges, EPA-600/2-064c, August 1977.

Jewell, Adrian, DiGiano, Urban Stormwater Pollutant Loadings, Pub. No. 113, Water Resource Research Center, University of Massachusetts - Amherst, 1981.

Metcalf & Eddy, Report to Metropolitan District Commission on Combined Sewer Overflows, Charles River Basin Facilities Planning Area, Volume I - Engineering Report, 1980.

NTIS, Guidelines for the Monitoring of Urban Runoff Quality, PB84-122902, 1983.

APPENDIX A

MANHOLE & REGULATOR INSPECTION FORMS

Washburn St. CSO
NPDES # 008

Metcalf & Eddy

FLOW REGULATOR INSPECTION SHEET

LOWER CONNECTICUT RIVER CSO STUDY

CITY OR TOWN Springfield DRAINAGE SUB-SYSTEM Ct. River
M&E MH # ______ COMMUNITY MH # (NOTE SPECIAL CONTRACT NO.) ______
LOCATION Center of Washburn St. outside of pump station.
DATE INSPECTED 1/24/86, TIME 1:00 AM [✓ PM], BY: J.C., H.V
WEATHER: RAIN ____, SNOW ____, COMMENTS cold
SYSTEM CONDITION: GNDWATER; HIGH ____ NORMAL ✓ LOW ____
RUNOFF (STORM, SNOW) ____
TYPE OF FLOW REGULATOR (DESCRIBE HOW REGULATOR WORKS)
Flow falls into diversion trough and flows into 18" inf. to Washburn St. Sewage Pumping Sta. Overflow flows over trough + weir to 6'6" overflow conduit

STRUCTURAL INVENTORY

ITEM	CONSTRUCTION MATERIALS & COMMENTS	CONDITION		
		GOOD	FAIR	POOR
COVER(S) + RING FRAME	C.I	✓		
STEPS	C.I	✓		
WALLS	conc.	✓		
APRON (TABLE)				
TROUGHS	conc.	✓		
INVERTS		✓		
OVERFLOW PIPE	6'-6" conc box culvert.	✓		
WEIR(S)	conc.	✓		
ORIFICE(S)				
REGULATOR GATE A	Discontinued			
REGULATOR GATE B	Discontinued			
FLOATS, TELLTALE, REGULATOR MECHANICS	Discontinued			
SCREEN + GRATES				

WASHINGTON St
CSO

COMMENTS ON OVERALL CONDITION, REGULATOR OPERATIONAL EFFICIENCY, VISIBLE INFILTRATION, ETC. Good overall condition

MANHOLE OVERFLOWING AT TIME OF INSPECTION YES ___ NO ✓

FLOW DEPTH THROUGH REGULATOR 3" in 21" V.C / 2" in 78" R.C.P / 6" in 18" eff OVERFLOW 0

MAINTENANCE HISTORY AND FREQUENCY OF OVERFLOW (BASED ON OBSERVATIONS AND INTERVIEWS WITH CITY PERSONNEL)
Reported to overflow during heavy rains. - minimal problems

DESCRIPTION OF OVERFLOW SEWER SYSTEM, INCLUDING ORIGIN AND ULTIMATE POINT OF DISCHARGE
Flow overflows trough + weir to a 6'-6" box culvert. There is a metal backwater gate and a positive closing sluice gate on the 78" overflow conduit. The sluice gate is only closed at times of high river stages. There is a positive closing sluice gate on the 18" influent to the pump station which is only closed at times of rain and high river stages. When the river is high and the backwater gates are force shut or sluice gate is closed, the overflow enters the flood control pump station and is pumped to the river.

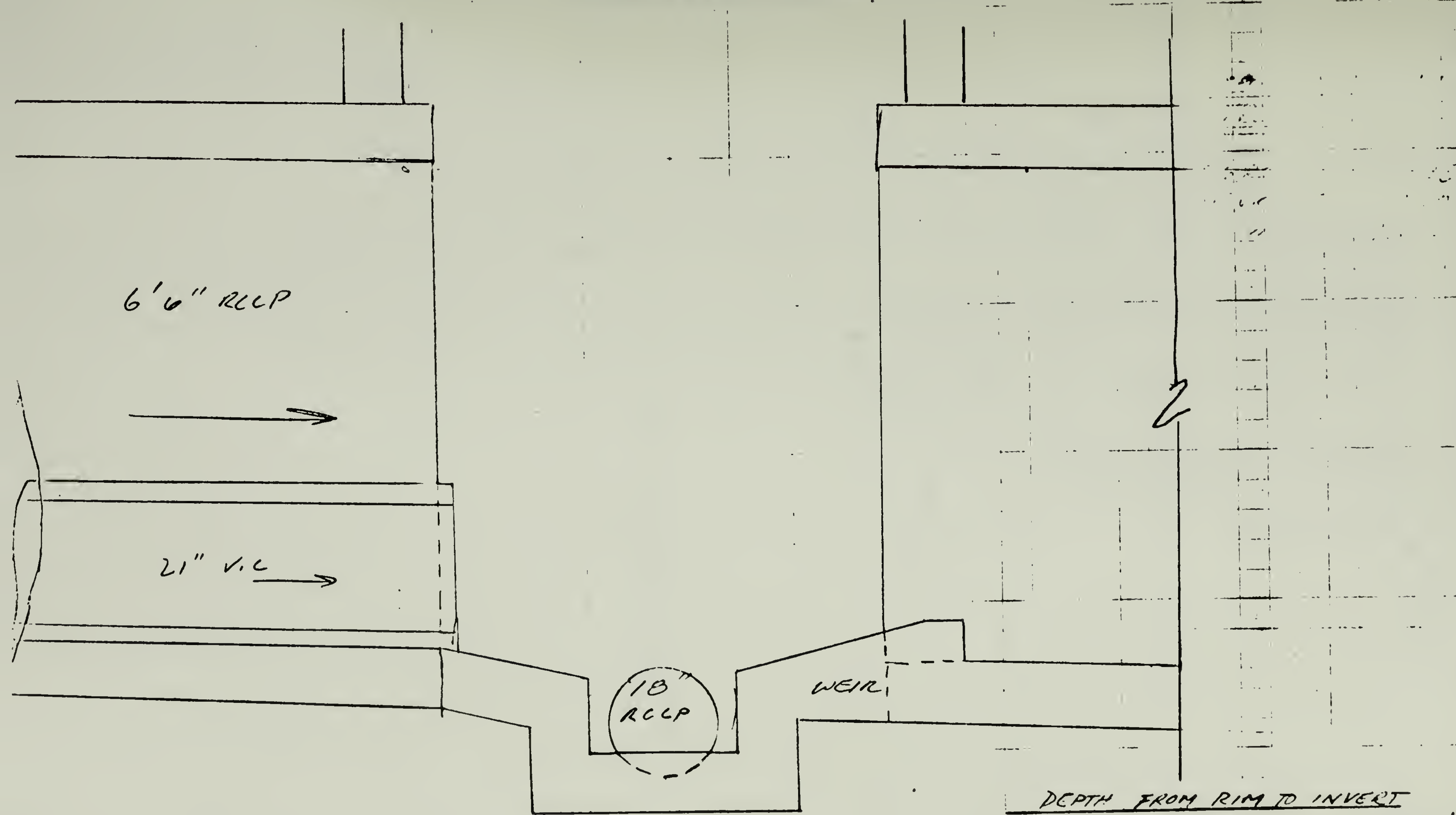
OTHER COMMENTS INCLUDING HIGH WATER MARKS, EVIDENCE OF CLOGGING, DEBRIS (TYPE + DEPTH), CORROSSION, AND CONDUIT CONDITION
6" of sediment in the overflow conduit, + 6-12" of standing water, no significant sediment in influent pipes or trough.

REFERENCE PLANS (DESIGN DRAWINGS)

NONREPRODUCIBLE GRID FORM 145

METCALF & EDDY, ENGINEERS

Project CT. RIVER CSO STUDY
Acct. No. 1701.
Page ___ of ___
Subject SPRINGFIELD CSO STA...
Comptd. By VOORHEES
Date 2-3-9.
Detail WASHBURNE ST. CSO
Ck'd. By ___
Date ___



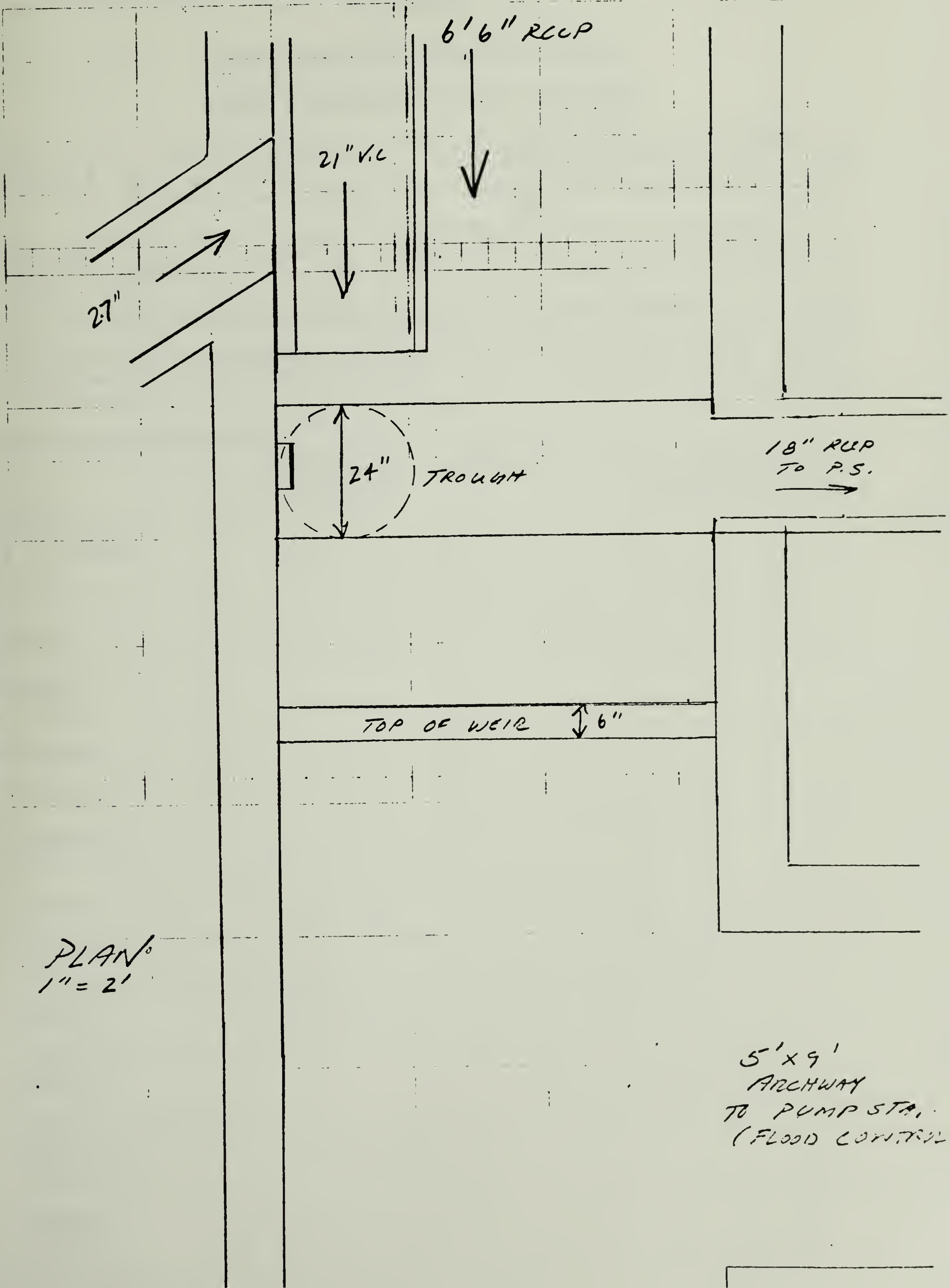
SECTION A-A
1" = 2'

DEPTH FROM RIM TO INVERT	
6'6" RCP INF	17.35'
21" V.C. INF.	17.30'
27"	14.79'
18" EFF TO P.S	19.12
TROUGH @ ℄	18.78
INF EDGE OF TROUGH	17.79
EFF EDGE OF TROUGH	17.75
TOP OF WEIR	17 06

NONREPRODUCIBLE GRID FORM 145

METCALF & EDDY, ENGINEERS

Project CT RIVER CSO STUDY Acct. No. 1701 Page ____ of ____
Subject SPRINGFIELD CSO STRUCTURES Comptd. By VOORHEES Date ____
Detail WASHBURN ST CSO Ck'd. By ____ Date ____



PLAN
1" = 2'

WORTHINGTON ST CSO
NPDES # 012

M&E
Metcalf & Eddy

FLOW REGULATOR INSPECTION SHEET

LOWER CONNECTICUT RIVER CSO STUDY

CITY OR TOWN *Springfield* DRAINAGE SUB-SYSTEM *CT. RIVER*
M&E MH # ______ COMMUNITY MH # (NOTE SPECIAL CONTRACT NO.) ______
LOCATION *UNDER W COLUMBUS AVE IN LINE W/ WORTHINGTON ST.*
DATE INSPECTED *1/29/86*, TIME *10:00* AM PM, BY; *V.C., M.V.*
WEATHER: RAIN ____, SNOW ____, COMMENTS ______
SYSTEM CONDITION: GNDWATER; HIGH ______ NORMAL *✓* LOW ______
RUNOFF (STORM, SNOW) *None*
TYPE OF FLOW REGULATOR (DESCRIBE HOW REGULATOR WORKS)
Perpendicular weir diverts flow through discontinued Mechanical (Brown) regulator chamber into the 48" interceptor

STRUCTURAL INVENTORY *WEIR is only accessable through sewer. - Regulator Chamber*

ITEM	CONSTRUCTION MATERIALS & COMMENTS	CONDITION		
		GOOD	FAIR	POOR
COVER(S) + RING FRAME	*steel doors*	✓		
STEPS	*C.I + Alum*	✓		
WALLS	*concrete*	✓		
APRON (TABLE)	*None*			
TROUGHS	*None*			
INVERTS				
OVERFLOW PIPE	*Brick - clean 5'7" x 7'0"*	✓		
WEIR(S)	*Brick*	✓		
ORIFICE(S)				
REGULATOR GATE A	*Removed*			
REGULATOR GATE B				
FLOATS, TELLTALE, REGULATOR MECHANICS	*Disconnected*			
SCREEN + GRATES				

COMMENTS ON OVERALL CONDITION, REGULATOR OPERATIONAL EFFICIENCY, VISIBLE INFILTRATION, ETC. Good condition, weir in good condition small opening to regulator chamber. Tends to clog.

MANHOLE OVERFLOWING AT TIME OF INSPECTION YES ___ [✓ NO]

FLOW DEPTH THROUGH REGULATOR 10" @ 3'x3' entrance OVERFLOW -

MAINTENANCE HISTORY AND FREQUENCY OF OVERFLOW (BASED ON OBSERVATIONS AND INTERVIEWS WITH CITY PERSONNEL) Tends to plug. Outfall checked daily for overflows, overflows during most rains.

DESCRIPTION OF OVERFLOW SEWER SYSTEM, INCLUDING ORIGIN AND ULTIMATE POINT OF DISCHARGE

Discharges to Ct. River through two wooden backwater gates, appeared to be in good condition did not observe any leaks. Picks up Worthington + Fort St sewers. The Bridge St overflow weir is located at the intersection of the two sewers. It is a high level weir and it appears unlikely to overflow often. It has been reported to overflow only twice (1955 + 1954)

OTHER COMMENTS INCLUDING HIGH WATER MARKS, EVIDENCE OF CLOGGING, DEBRIS (TYPE + DEPTH), CORROSSION, AND CONDUIT CONDITION Brick overflow sewer is in excellent condition.

REFERENCE PLANS (DESIGN DRAWINGS)

COMMENTS ON OVERALL CONDITION, REGULATOR OPERATIONAL EFFICIENCY, VISIBLE INFILTRATION, ETC. Good condition, weir in good condition small opening to regulator chamber. Tends to clog.

MANHOLE OVERFLOWING AT TIME OF INSPECTION YES ___ NO ✓

FLOW DEPTH THROUGH REGULATOR 10"@3'x3' entrance OVERFLOW -

MAINTENANCE HISTORY AND FREQUENCY OF OVERFLOW (BASED ON OBSERVATIONS AND INTERVIEWS WITH CITY PERSONNEL) Tends to plug. outfall checked daily for overflow, overflows during most rains.

DESCRIPTION OF OVERFLOW SEWER SYSTEM, INCLUDING ORIGIN AND ULTIMATE POINT OF DISCHARGE

Discharges to Ct. River through two wooden backwater gates, appeared to be in good condition did not observe any leaks. Picks up Worthington + Fort St sewers. The Bridge St overflow weir is located at the intersection of the two sewers. It is a high level weir and it appears unlikely to overflow often. It has been reported to overflow only twice (1955 + 1954)

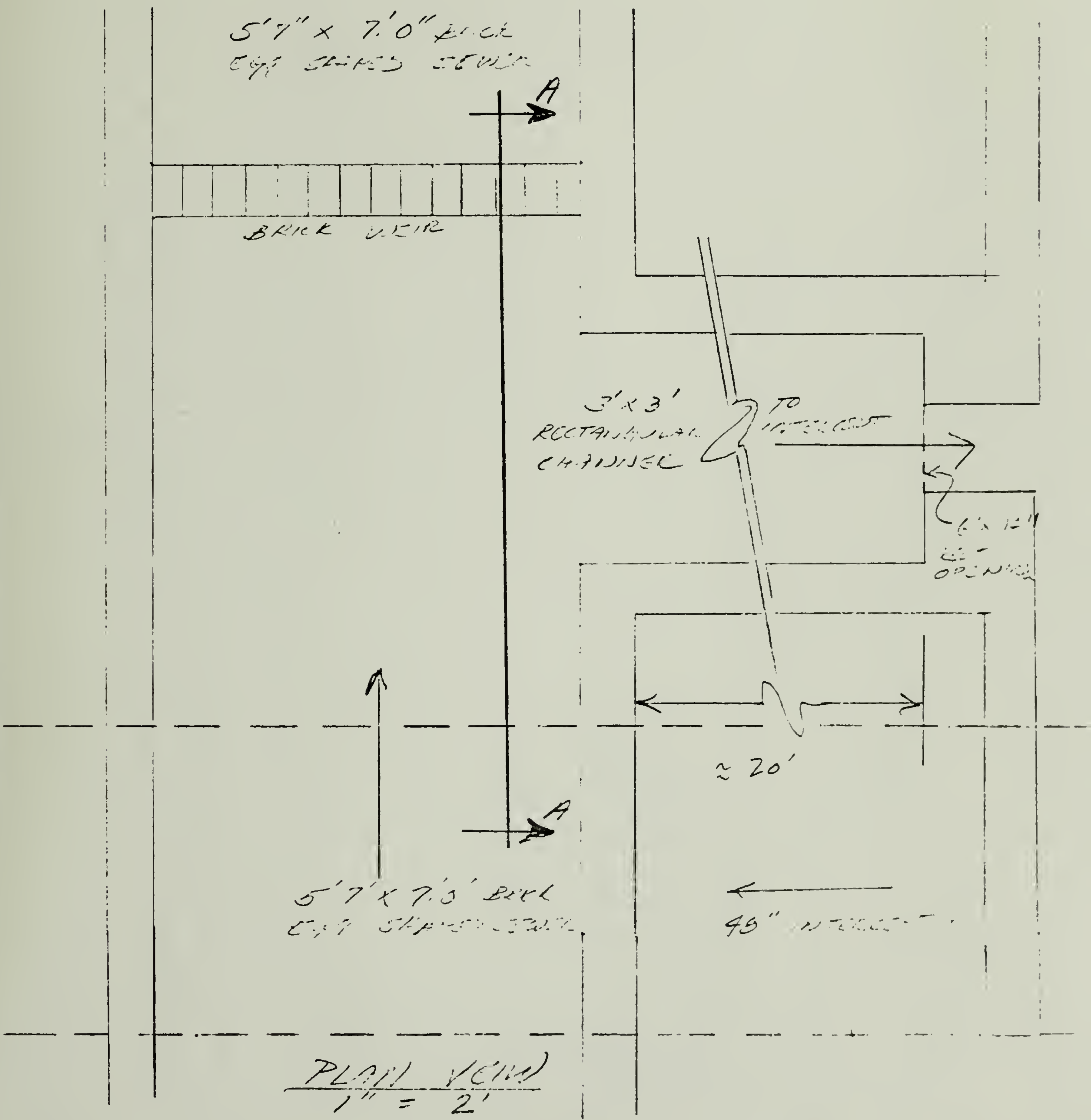
OTHER COMMENTS INCLUDING HIGH WATER MARKS, EVIDENCE OF CLOGGING, DEBRIS (TYPE + DEPTH), CORROSSION, AND CONDUIT CONDITION Brick overflow sewer is in excellent condition.

REFERENCE PLANS (DESIGN DRAWINGS)

Project	CT RIVER CSO STUDY	Acct. No.	1751	Page	2 of 2
Subject	SPRINGFIELD CSO STRUCTURES	Comptd. By	M.V	Date	
Detail	WORTHINGTON ST.	Ck'd. By		Date	

NONREPRODUCIBLE GRID FORM 145

METCALF & EDDY, ENGINEERS



PLAN VIEW
1" = 2'

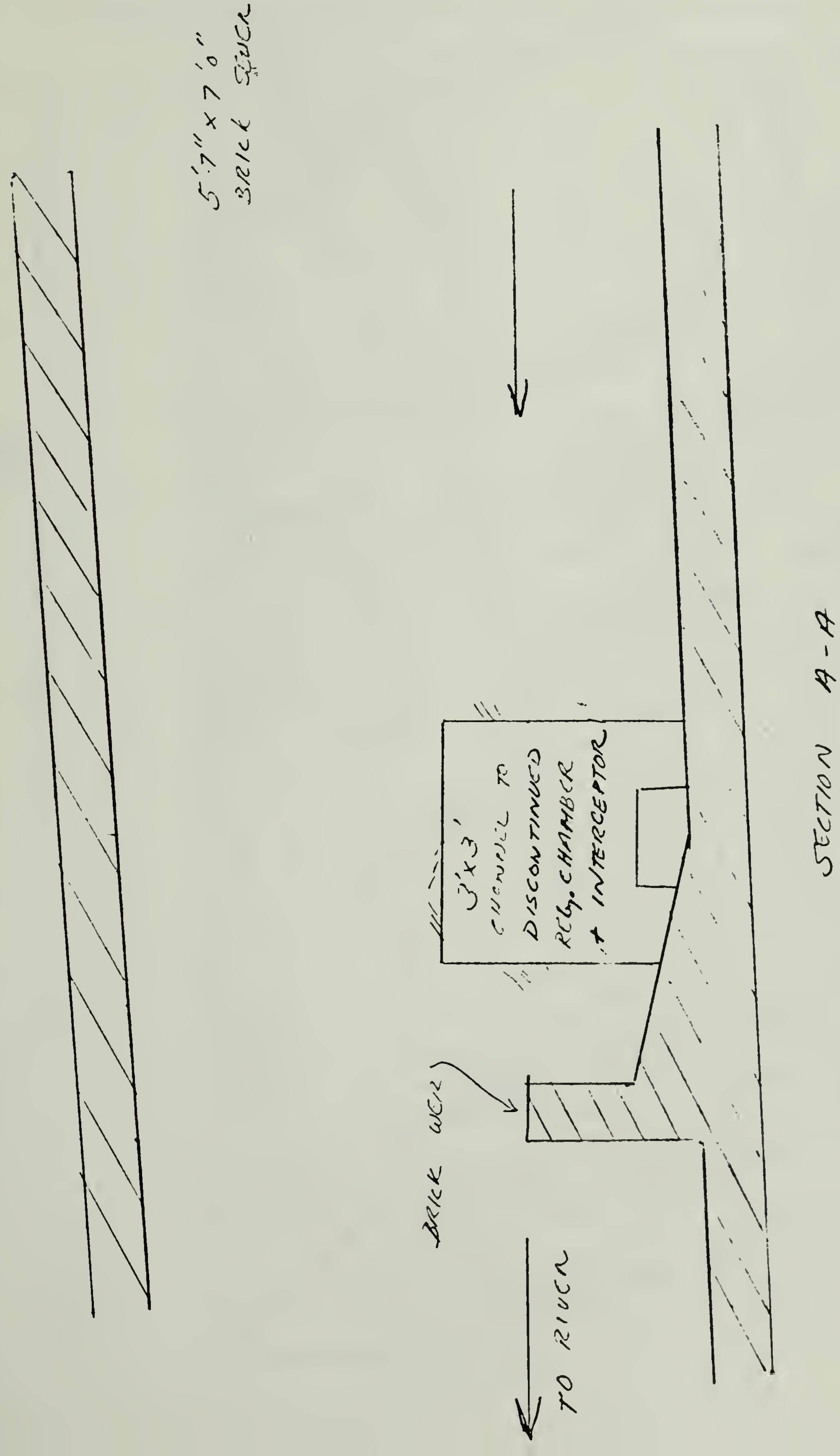
FLOW IS DIVERTED BY BRICK WEIR DOWN 3'x3' RECTANGULAR CHANNEL AND THROUGH 6'x4' RECTANGULAR OPENING INTO A DISCONTINUED REGULATOR CHAMBER WHERE IT DROPS INTO THE 48" CT RIVER INTERCEPTOR.

THE 48" INTERCEPTOR IS SHOWN ABOVE AS THE DASHED LINE AND LIES UNDER THE 5'7"x 7'0" BRICK SEWER AND REGULATOR CHAMBER.

Project CT RIVER CSO STUDY Acct. No. 1701 Page 3 of 3
Subject SPRINGFIELD CSO STRUCTURES Comptd. By MV Date
Detail WORTHINGTON ST Ck'd. By Date

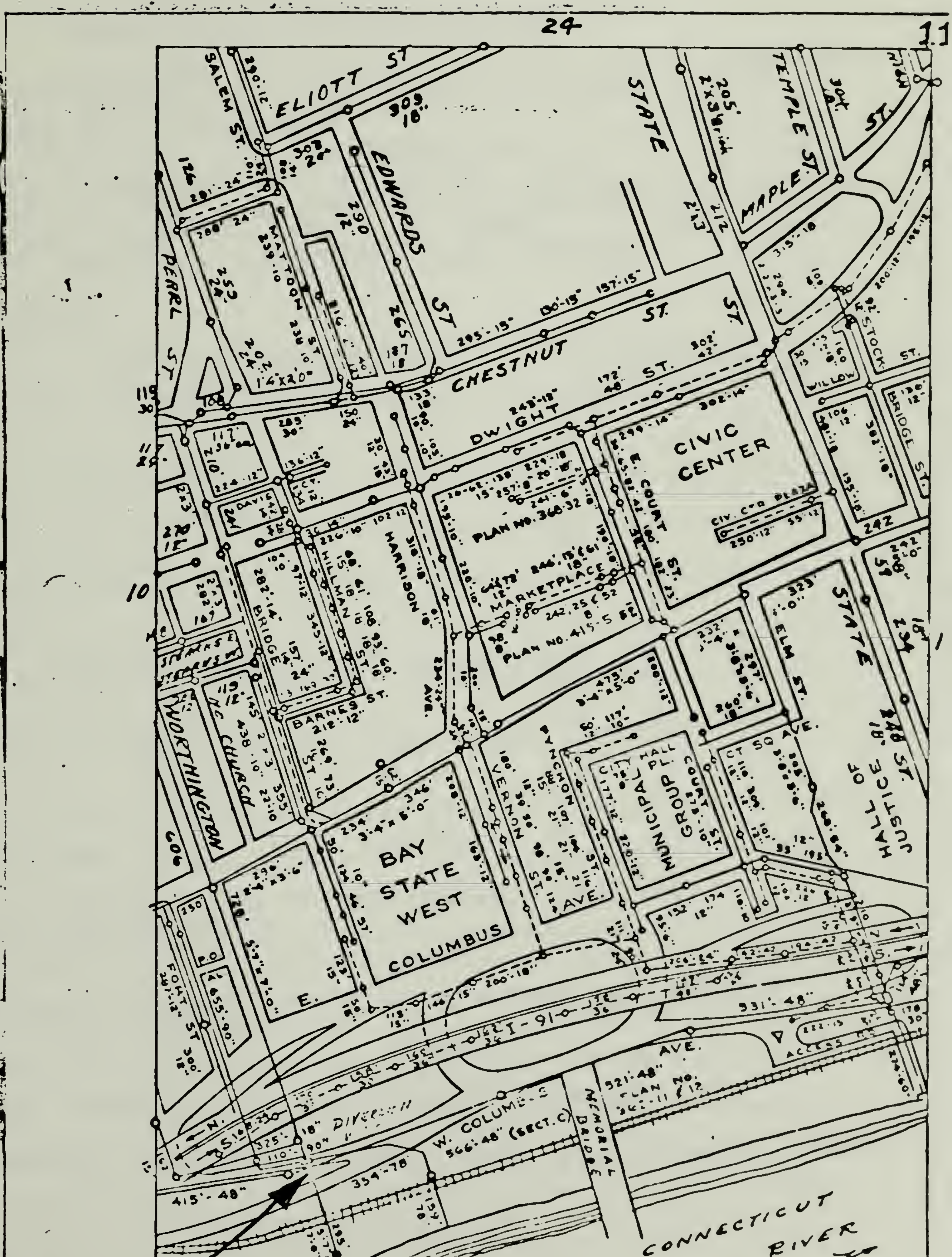
NONREPRODUCIBLE GRID FORM 145

METCALF & EDDY, ENGINEERS



SECTION A-A
1" = 2'

WORTHINGTON
ST. CSO



WORTHINGTON ST CSO

SPRINGFIELD

[illegible] ST.
Indian Orchard
Banner St CSO
NPDES # 043

M&E
Metcalf & Eddy

1

MANHOLE INSPECTION SHEET

LOWER CONNECTICUT RIVER CSO STUDY

CITY OR TOWN SPRINGFIELD · DRAINAGE SUB-SYSTEM INDIAN ORCHARD
M&E MH # ____, COMMUNITY MH # (NOTE SPECIFIC CONTRACT NO.) ____
LOCATION MAIN ST. BANNER ST.
SEWER NAME ____ REFERENCE MAP ____
DATE INSPECTED 4 FEB 86, TIME 2:30 pm BY: MV
WEATHER: RAIN ____, SNOW ____, COMMENTS 25° OVERCAST 3-4" SNOW COVER
SYSTEM CONDITION: GNDWATER; HIGH ____ NORMAL ____ LOW ____
RUNOFF (STORM, SNOW MELT) FREEZING - NO RUNOFF

MANHOLE INVENTORY

ITEM	CONSTRUCTION MATERIALS & COMMENTS	CONDITION GOOD	FAIR	POOR
COVER AND RING FRAME	CAST IRON	X		
STEPS	NO STEPS			
WALLS	BRICK	X		
APRON (TABLE)				
TROUGHS	BRICK FILLED WITH DEBRIS			
INVERTS				
INF. AND EFF. PIPES	1" SEDIMENT 1/2" INF. RCP			

GAS DETECTOR USED; YES ___ NO X, RESULTS ____

VISIBLE INFILTRATION THROUGH JOINTS, CRACKS, LINES, ETC.
NO VISIBLE INFILTRATION

HIGHWATER MARKS IN MANHOLE (HEIGHT ABOVE INVERT) NOT NOTED

DEPTH OF FLOW 1½" - 42" INF. VELOCITY ____

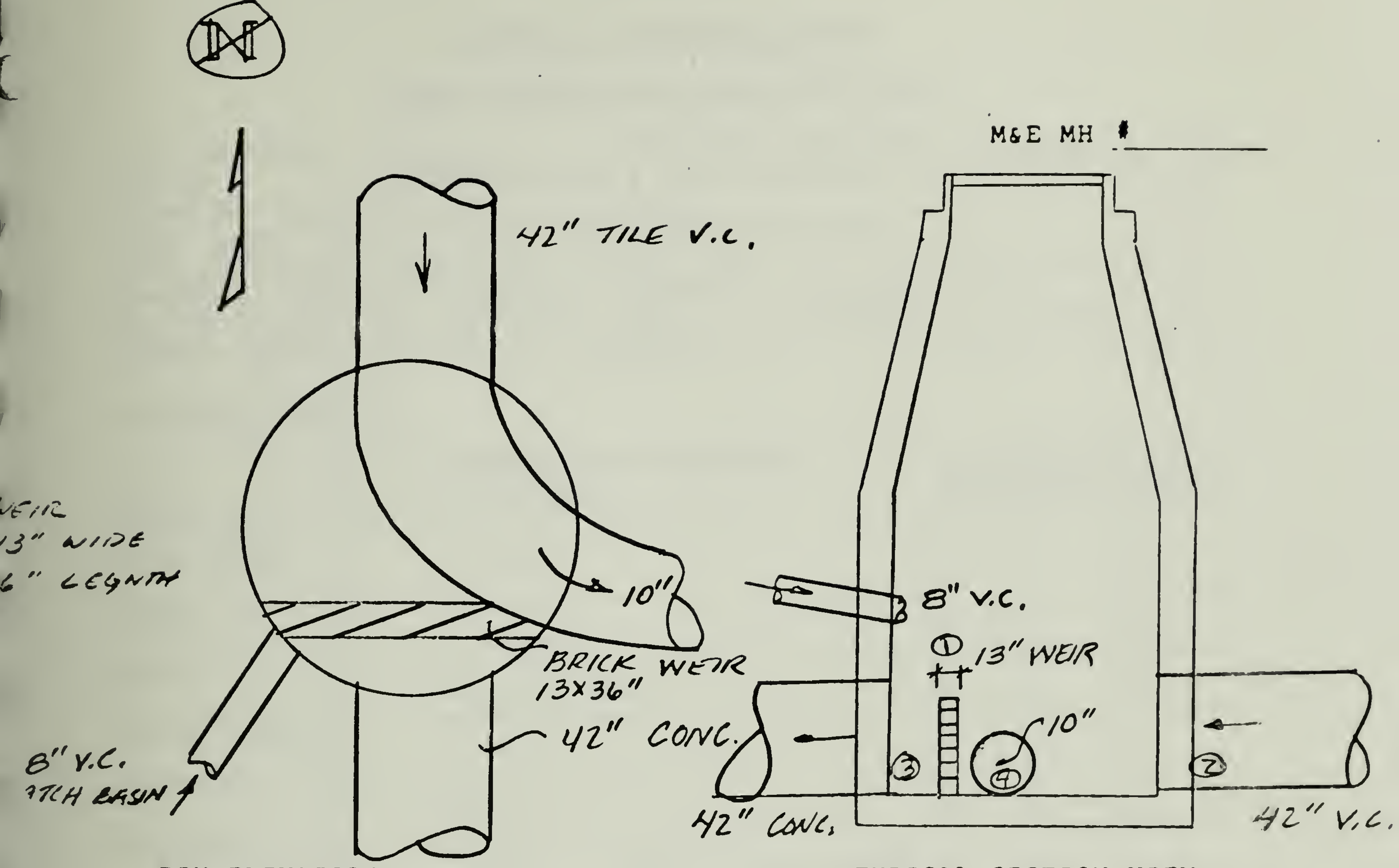
DEBRIS (TYPE + DEPTH) 1" COARSE SAND & GRAVEL

SPECIAL PROBLEMS, CONDITIONS; CSO M.H. see regulator sheet

RECOMMENDED MAINTENANCE ____

[illegible] – 7

M&E MH # ______



TYPICAL SECTION VIEW

RIM ELEVATION ______

SOURCE: ______

INVERT (DIA./INF. OR EFF.)	DEPTH FROM RIM	ELEVATION
1. TOP OF WEIR	11.45	
2. 42" V.C. INF.	12.10	
3. 42" CONC. EFF. OVER FLOW	12.05	
4. 10" V.C. INF. FROM C.B.	12.38	
5.		
6.		
7.		
8.		

Call St P.S
NPDES # 006

M&E
Metcalf & Eddy

-1-

MANHOLE INSPECTION SHEET

LOWER CONNECTICUT RIVER CSO STUDY

CITY OR TOWN Chicopee DRAINAGE SUB-SYSTEM Connecticut River
M&E MH # ______, COMMUNITY MH # (NOTE SPECIFIC CONTRACT NO.) ____
LOCATION Call St. Pump Station
SEWER NAME ______ REFERENCE MAP ______
DATE INSPECTED 3/14/86, TIME 11:40 BY; L.J., J.C, M.V.
WEATHER: RAIN ✓, SNOW ____, COMMENTS light
SYSTEM CONDITION: GNDWATER; HIGH ____ NORMAL ____ LOW ____
RUNOFF (STORM, SNOW MELT) storm

MANHOLE INVENTORY

ITEM	CONSTRUCTION MATERIALS & COMMENTS	CONDITION		
		GOOD	FAIR	POOR
COVER AND RING FRAME	C.I	✓		
STEPS	Alum	✓		
WALLS	Precast Conc.	✓		
APRON (TABLE)	conc.	✓		
TROUGHS	conc.	✓		
INVERTS	Brick, clean, loose bricks		✓	
INF. AND EFF. PIPES				

GAS DETECTOR USED; YES ✓ NO ___, RESULTS safe

VISIBLE INFILTRATION THROUGH JOINTS, CRACKS, LINES, ETC.
Loose bricks in overflow conduit. Complaints of bricks at pump station

HIGHWATER MARKS IN MANHOLE (HEIGHT ABOVE INVERT) ______

DEPTH OF FLOW 5" VELOCITY ______

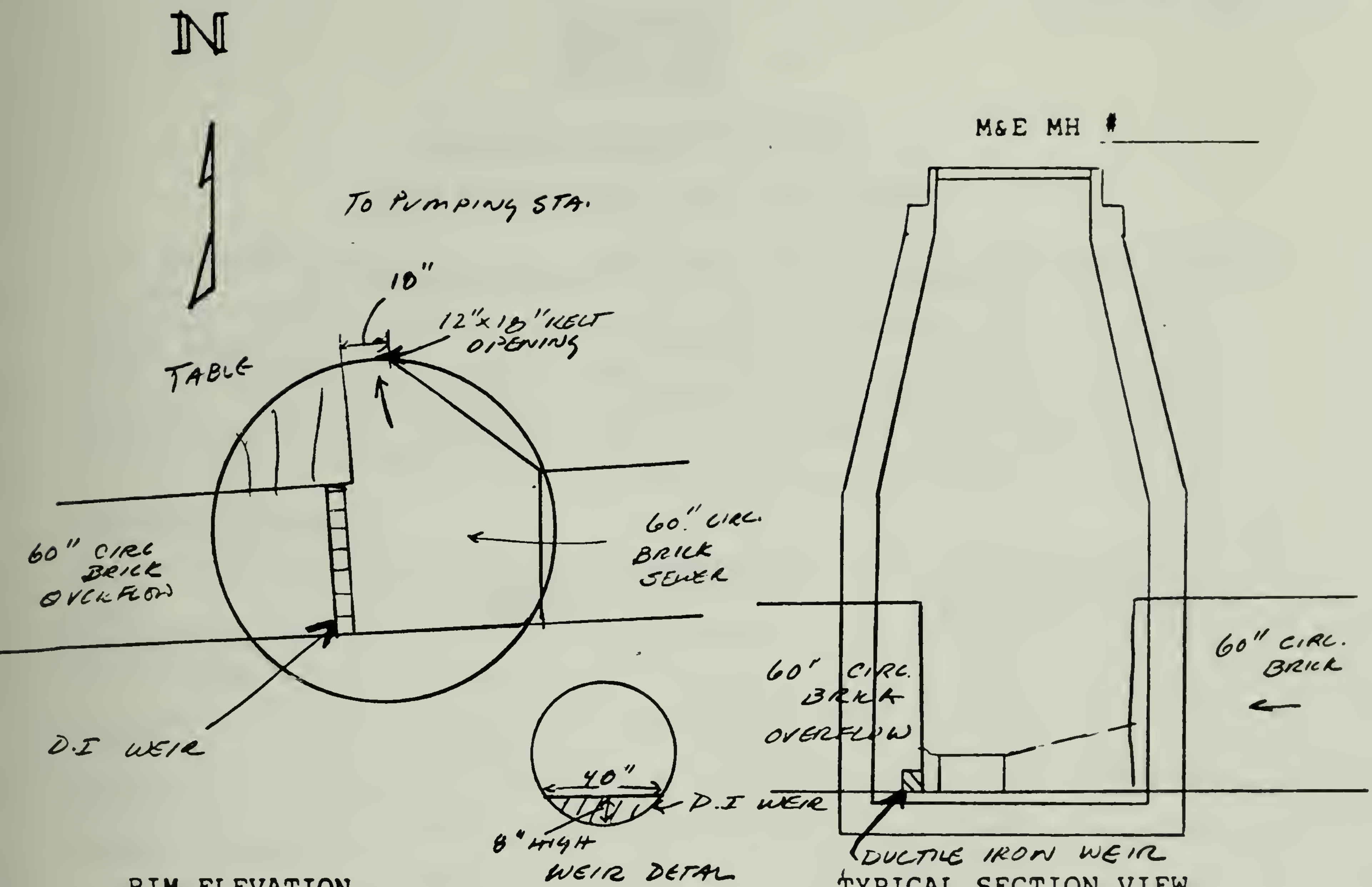
DEBRIS (TYPE + DEPTH) none

SPECIAL PROBLEMS, CONDITIONS; CSO. M.H. See regulator sheet. Inlet M.H to pump station.

RECOMMENDED MAINTENANCE ______

CALL ST. P.S.

M&E MH # ______



TYPICAL SECTION VIEW

RIM ELEVATION ______

SOURCE: ______

INVERT (DIA./INF. OR EFF.)	DEPTH FROM RIM	ELEVATION
1. 12"x18" RECT. EFF	≈ 22.5'	
2. TABLE. ≈ 60" OVERFLOW INV.	20.5'	
3.		
4.		
5.		
6.		
7.		
8.		

NPDES #021
Poland RD. CSO

M&E
Metcalf & Eddy

MANHOLE INSPECTION SHEET

LOWER CONNECTICUT RIVER CSO STUDY

CITY OR TOWN Chicopee DRAINAGE SUB-SYSTEM Chicopee River
M&E MH # ____, COMMUNITY MH # (NOTE SPECIFIC CONTRACT NO.) ____
LOCATION M.H outside Poland St. Ejector Sta.
SEWER NAME ____ REFERENCE MAP ____
DATE INSPECTED 3/14/86, TIME 10:20 BY; L.V., VC MV
WEATHER: RAIN ✓, SNOW ____, COMMENTS Light
SYSTEM CONDITION: GNDWATER; HIGH ____ NORMAL ____ LOW ____
RUNOFF (STORM, SNOW MELT) Slight

MANHOLE INVENTORY

ITEM	CONSTRUCTION MATERIALS & COMMENTS	CONDITION GOOD	FAIR	POOR
COVER AND RING FRAME	C.I	✓		
STEPS	Alum	✓		
WALLS	Precast conc	✓		
APRON (TABLE)	conc.	✓		
TROUGHS	not visible due to sed.			
INVERTS	clean. overflow			
INF. AND EFF. PIPES				

GAS DETECTOR USED; YES ✓ NO ____, RESULTS Safe

VISIBLE INFILTRATION THROUGH JOINTS, CRACKS, LINES, ETC.
Joints seperated

HIGHWATER MARKS IN MANHOLE (HEIGHT ABOVE INVERT) not visible

DEPTH OF FLOW 1/2" VELOCITY ____

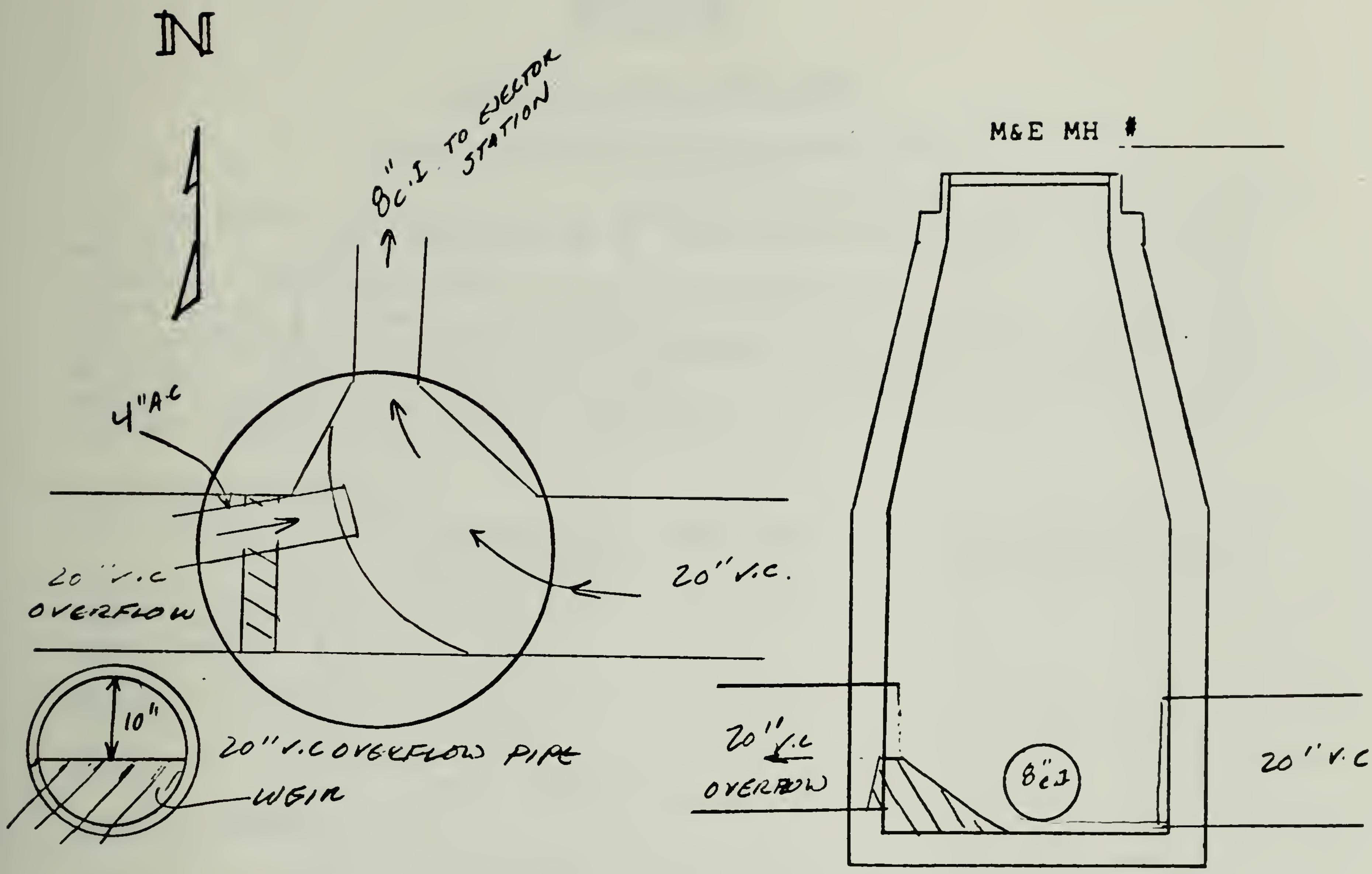
DEBRIS (TYPE + DEPTH) 5" sed in 20" V.C. inf invert

SPECIAL PROBLEMS, CONDITIONS; CSO. M.H See regulator form
20" V.C. inf invert is below the trough + 8' C.I. eff
causing sedimentation problem

RECOMMENDED MAINTENANCE ____

POLAND RD
CSO

M&E MH # ________



TYPICAL SECTION VIEW

RIM ELEVATION ________

SOURCE: ________

INVERT (DIA./INF. OR EFF.)	DEPTH FROM RIM	ELEVATION
1. 20" inf.	11.40'	
2. 8" C.I eff	11.30'	
3. 4" A.C Inf	8.6'	
4. 20" overflow	11.0'	
5. Top of weir	10.55	
6. center of trough	11.05	
7. float bottom	4.9'	
8.		

Granby Rd CSO
NPDES # 025

Metcalf & Eddy

1

MANHOLE INSPECTION SHEET

LOWER CONNECTICUT RIVER CSO STUDY

CITY OR TOWN Chicopee DRAINAGE SUB-SYSTEM Chicopee River
M&E MH # ______, COMMUNITY MH # (NOTE SPECIFIC CONTRACT NO.) ____
LOCATION Granby Rd.
SEWER NAME ______ REFERENCE MAP ______
DATE INSPECTED 3 / 14/86, TIME 10:00 BY; C.M. J.C. M.V.
WEATHER: RAIN ✓, SNOW ____, COMMENTS Drizzle - Sm puddles on rd
SYSTEM CONDITION: GNDWATER; HIGH ____ NORMAL ____ LOW ____
RUNOFF (STORM, SNOW MELT) Slight.

MANHOLE INVENTORY

ITEM	CONSTRUCTION MATERIALS & COMMENTS	CONDITION GOOD	FAIR	POOR
COVER AND RING FRAME	C.I	✓		
STEPS	C.I	✓		
WALLS	conc. block	✓		
APRON (TABLE)	conc Coverd brick	✓		
TROUGHS	½" Alum. adjustable weirplate	✓		
INVERTS	overflow 24" cracked	✓	✓	
INF. AND EFF. PIPES				

GAS DETECTOR USED; YES ✓ NO __, RESULTS Safe

VISIBLE INFILTRATION THROUGH JOINTS, CRACKS, LINES, ETC.
Joints Seperating

HIGHWATER MARKS IN MANHOLE (HEIGHT ABOVE INVERT) ______

DEPTH OF FLOW 2" VELOCITY ______

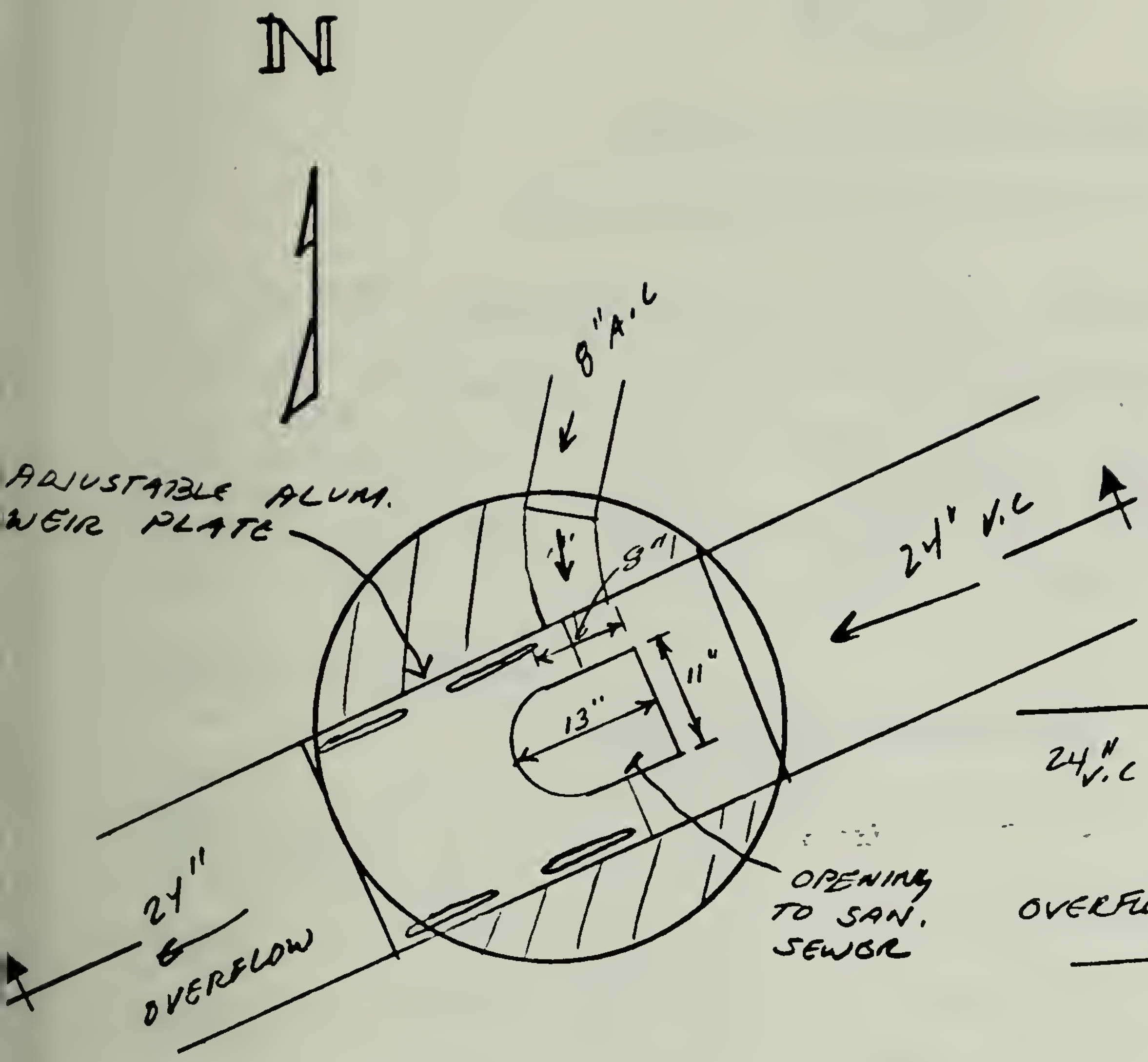
DEBRIS (TYPE + DEPTH) none visible in 24" + san eff; 8" inf. plugged with sand

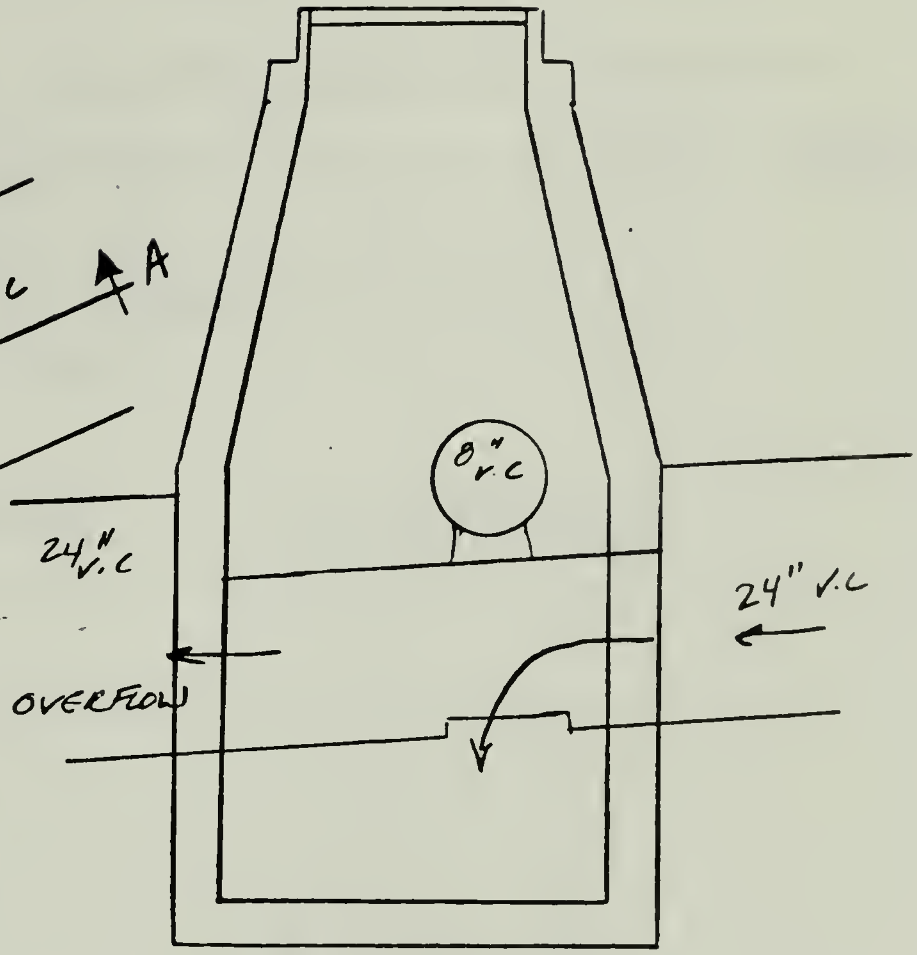
SPECIAL PROBLEMS, CONDITIONS; CSO M.H. See regulator form.

RECOMMENDED MAINTENANCE ______

GRANBY RD.
CSO

M&E MH # ____________





A - A
TYPICAL SECTION VIEW

RIM ELEVATION ____________

SOURCE: ____________

INVERT (DIA./INF. OR EFF.)	DEPTH FROM RIM	ELEVATION
1. 24" V.C INF.	5.82'	
2. SAN. INVERT AT OPENING	6.9'	
3. 24" OVERFLOW	5.86	
4. 8" A.C inf	4.7	
5. Top of trough + weirplate	5.6'	
6.		
7.		
8.		

Providence Hospital CSO
NPDES # 002

M&E
Metcalf & Eddy

MANHOLE INSPECTION SHEET

LOWER CONNECTICUT RIVER CSO STUDY

CITY OR TOWN Holyoke DRAINAGE SUB-SYSTEM CT. RIVER South interceptor
M&E MH # ____, COMMUNITY MH # (NOTE SPECIFIC CONTRACT NO.) ____
LOCATION in grassed bank next to turnaround across from entrance to Prov. Hospital
SEWER NAME ____ REFERENCE MAP ____
DATE INSPECTED 3/14/86, TIME 2:00 BY; L.V., V.C., M.V
WEATHER: RAIN ✓, SNOW ____, COMMENTS steady downpour
SYSTEM CONDITION: GNDWATER; HIGH ____ NORMAL ____ LOW ____
RUNOFF (STORM, SNOW MELT) Storm runoff.

MANHOLE INVENTORY

ITEM	CONSTRUCTION MATERIALS & COMMENTS	CONDITION		
		GOOD	FAIR	POOR
COVER AND RING FRAME	C.I.	✓		
STEPS	Alum	✓		
WALLS	Precast conc	✓		
APRON (TABLE)	conc.	✓		
TROUGHS	Alum.	✓		
INVERTS	clear			
INF. AND EFF. PIPES				

GAS DETECTOR USED; YES ✓ NO ____, RESULTS safe.

VISIBLE INFILTRATION THROUGH JOINTS, CRACKS, LINES, ETC.

HIGHWATER MARKS IN MANHOLE (HEIGHT ABOVE INVERT) ____

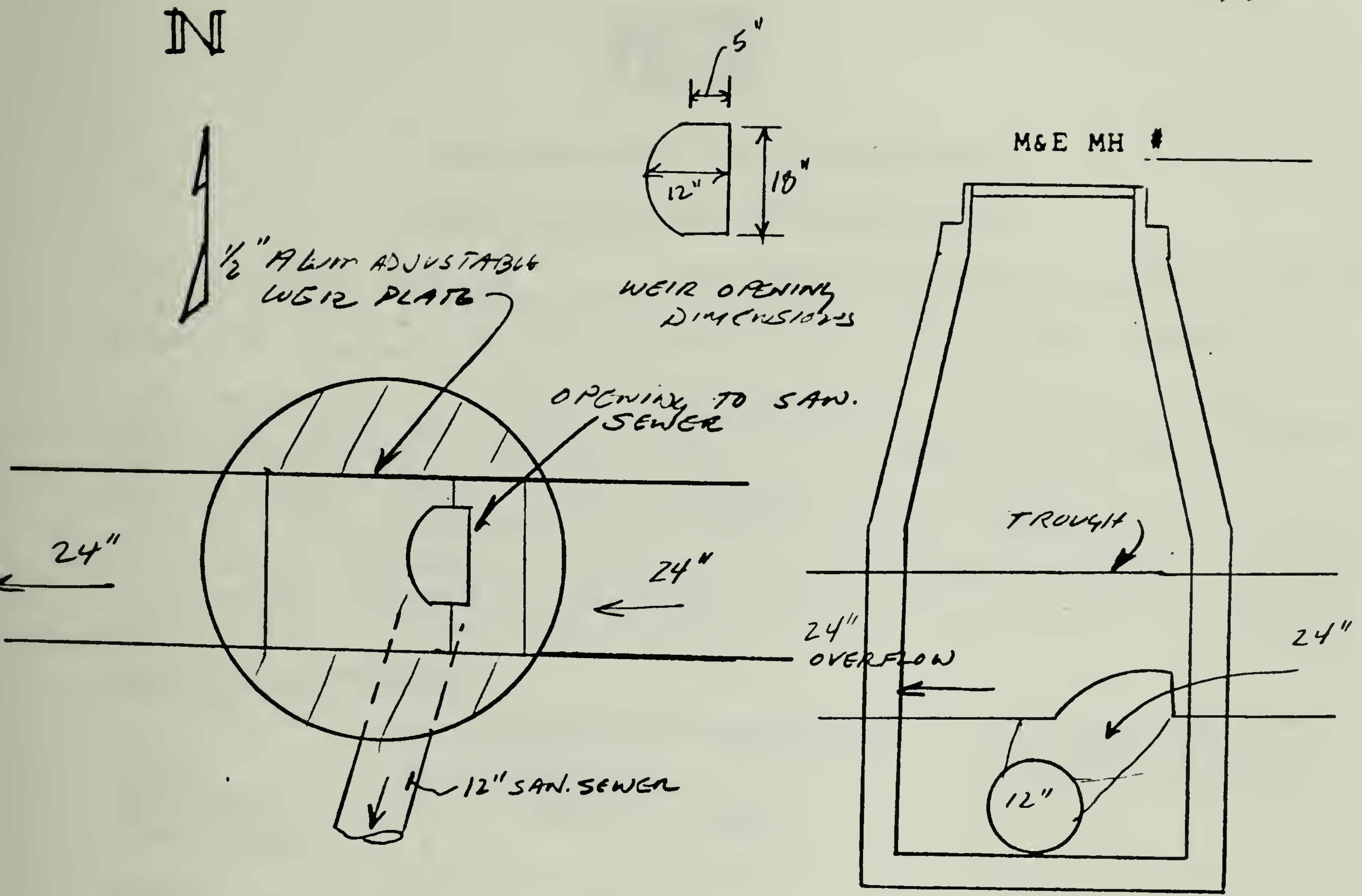
DEPTH OF FLOW 3" ind 1" overflow VELOCITY very fast

DEBRIS (TYPE + DEPTH) 0

SPECIAL PROBLEMS, CONDITIONS; CSO M.H see regulator sheets, Adjustable alum. weir plate.

RECOMMENDED MAINTENANCE ____

PROVIDENCE HOSPITAL
CSO



M&E MH # ____________

TYPICAL SECTION VIEW

RIM ELEVATION ____________

SOURCE: ____________

INVERT (DIA./INF. OR EFF.)	DEPTH FROM RIM	ELEVATION
1. 24" inf	14.50'	
2. eff inv. below opening	16.05'	
3. 24" overflow	14.45'	
4. table + edge of trough	12.30'	
5. upstm edge of opening	14.50'	
6. downstm edge of opening	14.35	
7.		
8.		

Mosher St CSO
NPDES # 014

M&E
Metcalf & Eddy

FLOW REGULATOR INSPECTION SHEET

LOWER CONNECTICUT RIVER CSO STUDY

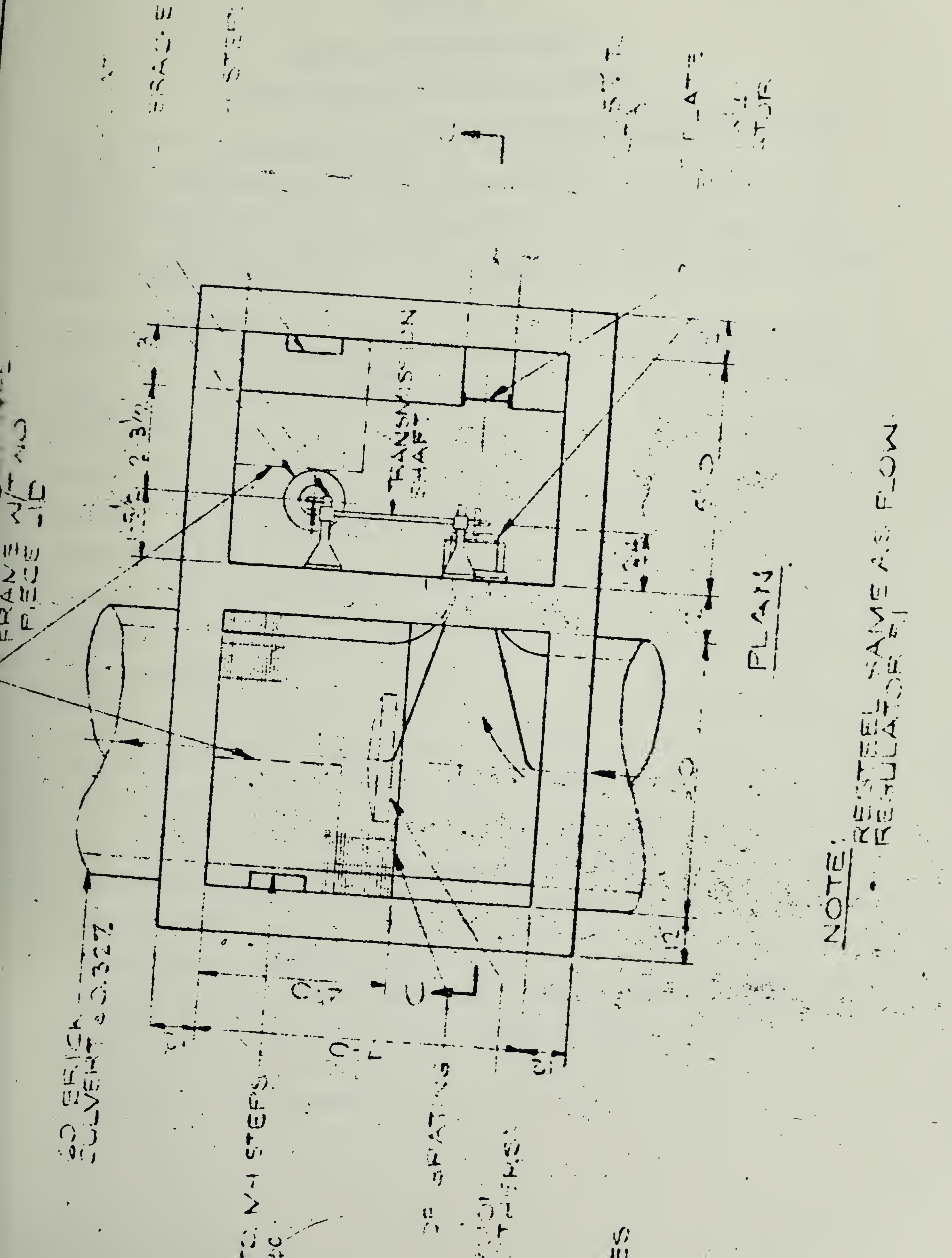
CITY OR TOWN Holyoke DRAINAGE SUB-SYSTEM Ct. River - South Interc
M&E MH # ______ COMMUNITY MH # (NOTE SPECIAL CONTRACT NO.) ______
LOCATION Concrete chamber in Mosher st outside pump station.
DATE INSPECTED 3/14/86, TIME 3:00 AM [✓ PM], BY; V.C, L.J, M.V
WEATHER: RAIN x, SNOW ____, COMMENTS steady rain scince 12:30PM.
SYSTEM CONDITION: GNDWATER; HIGH ______ NORMAL ______ LOW ______
RUNOFF (STORM, SNOW) storm runoff
TYPE OF FLOW REGULATOR (DESCRIBE HOW REGULATOR WORKS) ______
Mechanical Regulator - Weir diverts flow into float and gate regulator chamber, sewage level in float chamber dictates how open gate will be.

STRUCTURAL INVENTORY

ITEM	CONSTRUCTION MATERIALS & COMMENTS	CONDITION		
		GOOD	FAIR	POOR
COVER(S) + RING FRAME	Alum. doors	✓		
STEPS	Alum.	✓		
WALLS	Concrete chamber	✓		
APRON (TABLE)	Metal grate over sewer safe.	✓		
TROUGHS	not visible			
INVERTS	not visible			
OVERFLOW PIPE	60" Brick			
WEIR(S)	not visible *			
ORIFICE(S)				
REGULATOR GATE A				
REGULATOR GATE B				
FLOATS, TELLTALE, REGULATOR MECHANICS				
SCREEN + GRATES				

* overflowing at time of inspection

Mosher St.
CSO



PLAN

NOTE:
• RESTEEL SAME AS FLOW
REGULATOR #1

Metcalf & Eddy

-1,

MANHOLE INSPECTION SHEET

LOWER CONNECTICUT RIVER CSO STUDY

CITY OR TOWN Ludlow DRAINAGE SUB-SYSTEM Chicopee River
M&E MH # ____, COMMUNITY MH # (NOTE SPECIFIC CONTRACT NO.) ____
LOCATION Franklin St + State St.
SEWER NAME ____ REFERENCE MAP ____
DATE INSPECTED 2 / 21 / 86, TIME 9:00 BY: U.P., U.C., M.V
WEATHER: RAIN ✓, SNOW ____, COMMENTS LIGHT RAIN
SYSTEM CONDITION: GNDWATER; HIGH ____ NORMAL ✓ LOW ____
RUNOFF (STORM, SNOW MELT) Puddles on street - Storm r-noff

MANHOLE INVENTORY

ITEM	CONSTRUCTION MATERIALS & COMMENTS	CONDITION GOOD	FAIR	POOR
COVER AND RING FRAME	C.I	✓		
STEPS	None			
WALLS	concrete - some errosion		✓ ✓	
APRON (TABLE)				
TROUGHS	Eroded due to drop inlet			✓
INVERTS	clean 12" inf (A) cracked			
INF. AND EFF. PIPES				

GAS DETECTOR USED; YES ✓ NO ____, RESULTS safe

VISIBLE INFILTRATION THROUGH JOINTS, CRACKS, LINES, ETC.

HIGHWATER MARKS IN MANHOLE (HEIGHT ABOVE INVERT) ____

DEPTH OF FLOW 2" in 15" eff. VELOCITY ____

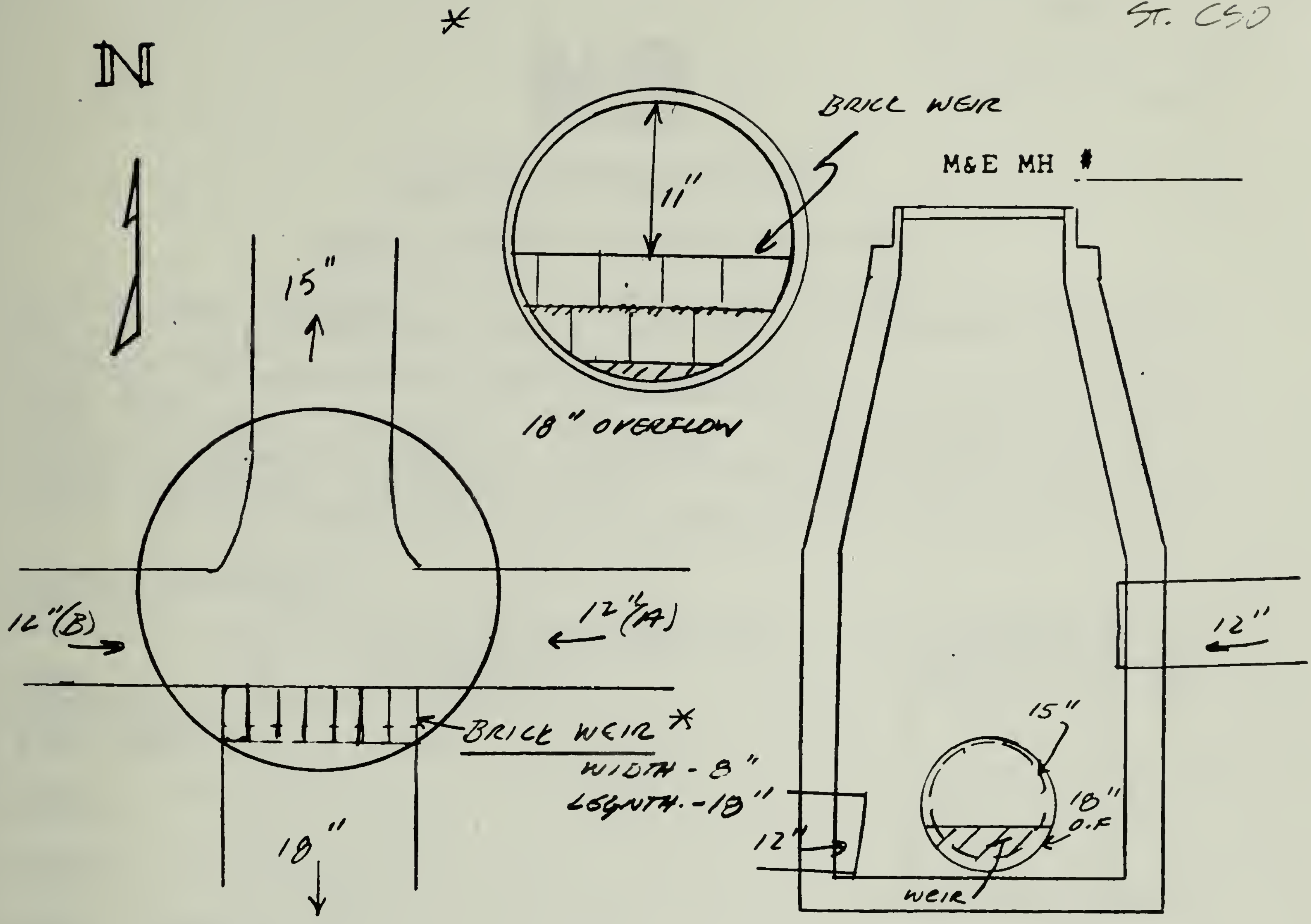
DEBRIS (TYPE + DEPTH) 0

SPECIAL PROBLEMS, CONDITIONS; CSO M.H. see regulator sheet

RECOMMENDED MAINTENANCE ____

FRANKLIN & STATE
ST. CSO

M&E MH # ____________



TYPICAL SECTION VIEW

RIM ELEVATION ____________

SOURCE: ____________

INVERT (DIA./INF. OR EFF.)	DEPTH FROM RIM	ELEVATION
1. 12" inf. (A)	6.75'	
2. 12" inf (B)	10.03	
3. 15" eff.	9.90'	
4. 18" OVERFLOW	10.12'	
5. TOP OF WEIR	9.19'	
6. CENTER OF TROUGH.	10.03	
7.		
8.		

M&E
Metcalf & Eddy

CSO M.H
OTTAWA ST + WALNUT ST
NPDES # 009

MANHOLE INSPECTION SHEET

LOWER CONNECTICUT RIVER CSO STUDY

CITY OR TOWN Agawam DRAINAGE SUB-SYSTEM ____
M&E MH # W-13, COMMUNITY MH # (NOTE SPECIFIC CONTRACT NO.) W' ''
LOCATION 91 WALNUT ST AT END OF DRIVE
SEWER NAME ____ REFERENCE MAP ____
DATE INSPECTED 1/7/86, TIME 10'00 BY; H.V., V.C.,
WEATHER: RAIN ____, SNOW ____, COMMENTS CLEAR + COLD
SYSTEM CONDITION: GNDWATER; HIGH ____ NORMAL ✓ LOW ____
RUNOFF (STORM, SNOW MELT) NONE

MANHOLE INVENTORY

ITEM	CONSTRUCTION MATERIALS & COMMENTS	CONDITION GOOD	FAIR	POOR
COVER AND RING FRAME	C.I.	✓		
STEPS	C.I	✓		
WALLS	BRICK	✓		
APRON (TABLE)	~~ON~~ COULD NOT SEE			
TROUGHS	COULD NOT SEE			
INVERTS	COULD NOT SEE			
INF. AND EFF. PIPES				

GAS DETECTOR USED; YES ✓ NO ____, RESULTS SAFE

VISIBLE INFILTRATION THROUGH JOINTS, CRACKS, LINES, ETC.

HIGHWATER MARKS IN MANHOLE (HEIGHT ABOVE INVERT) ____

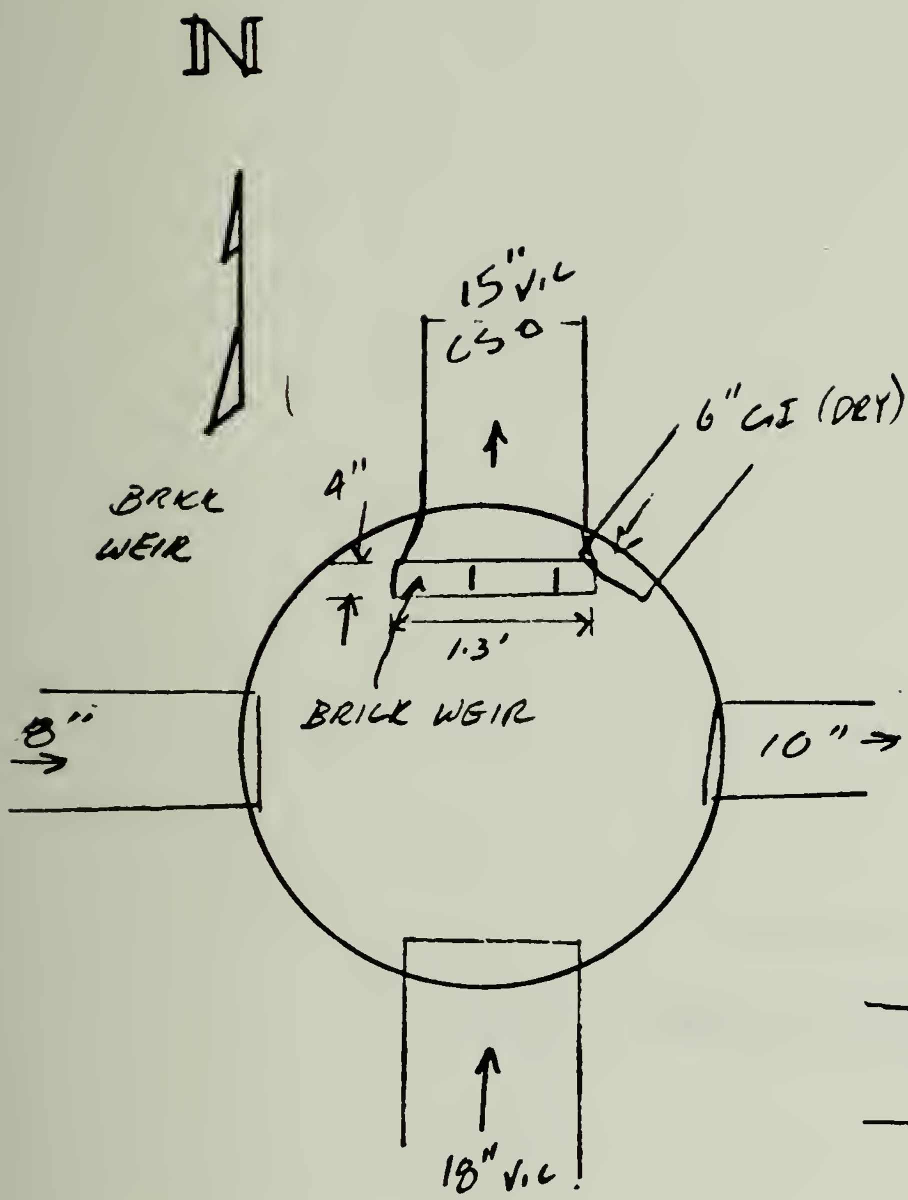
DEPTH OF FLOW ____ VELOCITY ____

DEBRIS (TYPE + DEPTH) 10" SED. IN M.H, 10" IN 18" INF., 10" EFF Almost completely plugged

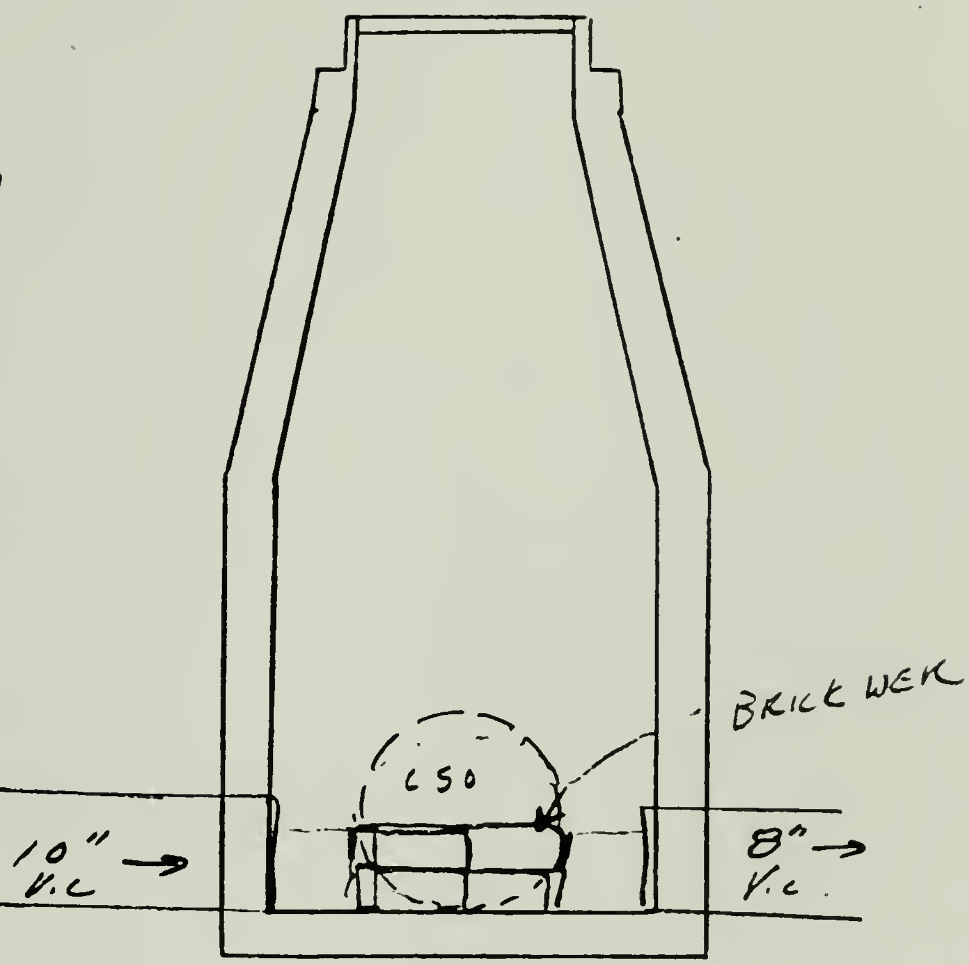
SPECIAL PROBLEMS, CONDITIONS; CSO - see regulator sheet
Dry weather overflowing at time of inspection

RECOMMENDED MAINTENANCE clean downstrm sewers
CLEAN COMBINED SEWER LINE

OTTAWA & WALNUT
STS. CSO



M&E MH # ________



TYPICAL SECTION VIEW

RIM ELEVATION ________

SOURCE: ________

INVERT (DIA./INF. OR EFF.)	DEPTH FROM RIM	ELEVATION
1. 18" V.C. INF.	8.0'	
2. 10" V.C INF	8.0'	
3. 8" V.C. EFF	8.0'	
4. 15" V.C OVERFLOW	7.8'	
5. TOP OF BRICK WEIR	7.0'	
6.		
7.		
8.		

APPENDIX B

QUALITY ASSURANCE/QUALITY CONTROL

General

This Appendix outlines the policies and procedures to be followed for the spring 1986 monitoring program of the Phase II Lower Connecticut River CSO Study. The monitoring program includes the continuous monitoring of CSO discharges, collection of grab samples during dry and wet weather, and laboratory analysis of CSO samples. These are described in the following sections.

Continuous Monitoring Program. This program will consist of monitoring of both the quantity and the quality of CSO discharges at ten CSOs and monitoring of precipitation at five rain gauging stations. The monitoring will be conducted over an eight week study period beginning April 7, 1986. It is anticipated that three storm events will be monitored during the eight week program. Scan-N-Seal Environmental Services, Inc. is under contract to Metcalf & Eddy to provide the monitoring equipment and the labor required to install and maintain the equipment over the eight week study period. Scan-N-Seal will provide the following services as part of this contract:

A. Install, monitor, and maintain one flow monitoring device capable of obtaining depth of flow and velocity continuously at each of the ten sub-areas with one spare monitor for a total of eleven monitoring devices.

   Each monitor shall be maintained in place for the period of eight weeks.

B. Install, sample, and maintain one automatic sampling device at each of the ten sub-areas with one spare sampler for a total of eleven samplers.

Each sampling device shall be maintained in place for the period of eight weeks.

C. Install and maintain five rain gauges at those locations designated by Metcalf & Eddy for a period of eight weeks.

Monitoring Stations. All stations to be monitored will be inspected by Scan-N-Seal in conjunction with Metcalf & Eddy prior to installation of the monitoring equipment. Table B-1 presents the physical characteristics of the ten stations selected for continuous CSO monitoring. Table B-2 presents the location and description of the five stations selected for the monitoring of precipitation. As is indicated in this table, the rain gauges will be placed on the roofs of public buildings. Metcalf & Eddy will secure the approval from public officials for the installation and maintenance of the rain gauging equipment.

Equipment Installation. Scan-N-Seal will prepare all stations for the installation of the continuous monitoring equipment. A period of approximately one week will be required by Scan-N-Seal for the cleaning of the ten CSO stations and the construction of platforms and shelves to hold the monitoring and sampling equipment. The rain gauging stations will not require physical preparation of the sites.

Scan-N-Seal will provide the labor, vehicle, and tools required for the preparation, installation, and maintenance of the equipment at all monitoring sites. Metcalf & Eddy will inspect the final installation of the equipment to insure proper placement of the monitors.

TABLE B-1. PHYSICAL CHARACTERISTICS OF CSO MONITORING STATIONS

CSO Name	CSO #	Location	Receiving Water	Diameter	Shape	Depth to Invert
Worthington Street	012	Springfield	Connecticut R.	5'7" x 7'0"	Box Culv.	15 ft.
Washburn Sreet	008	Springfield	Connecticut R.	6'6"	Box Culv.	17 ft.
Banner Street	043	Springfield	Chicopee R.	42"	Circular	12 ft.
Call Street PS	006	Chicopee	Connecticut R.	60"	Circular	22 ft.
Poland Road	021	Chicopee	Chicopee R.	20"	Circular	12 ft.
Granby Road	025	Chicopee	Chicopee R.	24"	Circular	6 ft.
Mosher Street PS	014	Holyoke	Connecticut R.	60"	Circular	25 ft.
Providence Hospital	002	Holyoke	Connecticut R.	24"	Circular	15 ft.
State, Franklin Streets	010	Ludlow	Chicopee R.	18"	Circular	10 ft.
Ottawa Street	009	Agawam	Westfield R.	15"	Circular	8 ft.

TABLE B-2. LOCATION OF CONTINUOUS RAIN GAUGES

Community	Location	Building	CSOs in Proximity
Springfield	Columbus Ave.	City Engineering Dept.	007 012
Chicopee	Front Street	Chicopee Highway Garage	021 025
Holyoke	Berkshire St.	Holyoke WWTP	006 014 002
Ludlow	Center St.	Abandonned WWTP	010 043
Agawam	Main St.	Town Hall/Police Station	009

Flow Monitors. Following installation, each Flowlogger™ will be programmed by Scan-N-Seal with the operational data (time, date, instrument number, and site characteristics). The logging interval will initially be set to record the flow once every five minutes.

Scan-N-Seal will inspect flow logging devices once each working day to check equipment operation and battery power. Each Flowlogger™ will also be interrogated each day by Scan-N-Seal to insure proper data acquisition. Once every seven days, Scan-N-Seal will retrieve a complete set of the data and reset the monitors. Any flow data that is collected, either from base flow, dry weather overflow, or storm generated CSO discharges will be sent to Metcalf & Eddy for reduction and analysis. Metcalf & Eddy will create and store back-up copies of each data set.

In the case that a Flowlogger™ does not pass the daily equipment check, Scan-N-Seal will immediately replace it with the spare Flowlogger™ provided as part of the service contract. The faulty Flowlogger™ will also be immediately repaired by Scan-N-Seal in order to maintain a functional spare monitor. In this way, data loss due to equipment failure will be minimized.

Automatic Samplers. Following installation, the automatic samplers will be inspected by Scan-N-Seal at least once each working day to check the battery power and operability of the equipment. In the case that an automatic sampler does not pass the daily equipment check, Scan-N-Seal will immediately replace

it with the spare sampler provided as part of the service contract. The faulty sampler will be repaired immediately by Scan-N-Seal in order to maintain a functional spare sampler.

Rain Gauges. Following installation, Scan-N-Seal will inspect all five rain gauges once each working day to insure continuous functioning of the equipment. The rain gauge charts will be changed once every seven days by Scan-N-Seal and delivered to Metcalf & Eddy for data analysis regardless of whether a storm has occurred.

Sampling Event Notification. Scan-N-Seal will maintain a two man crew onsite for 5 to 7 days a week depending on weather predictions. Metcalf and Eddy will make decisions relative to crew availability for forecasted storm-events on weekends. Based on predicted weather conditions, a go/no-go decision will be made jointly between Metcalf & Eddy's project team and Scan-N-Seal's field crew chief on a forcasted storm event. It is anticipated that this decision will be made at least 3 hours prior to the start of sampling efforts. Once a go decision has been made, Scan-N-Seal will notify their second field crew, ready the samplers for activation and set the sampling interval. Metcalf & Eddy will notify the laboratory and dispatch two field crews to the area. One crew, the sewer inspection team, may already be on site depending on the timing of the storm event.

Sampling Protocol. Once a go decision has been made, Scan-N-Seal will visit each site to ready each sampler. Just prior to each storm event, the sampling interval will be selected by Scan-N-Seal in conjunction with Metcalf & Eddy to insure adequate sampling throughout the anticipated duration of the storm. The sampling interval will range from 30 to 60 minutes, with 30 minutes being the initial setting.

Scan-N-Seal will adjust the sampling interval on the automatic samplers as required, fill all holding containers with ice, and check the positioning of the depth switch activator. Sampling will begin automatically at each site equipped with a depth switch once a CSO discharge occurs that trips the depth switch. Samplers will be manually activated at this time at those sites not equipped with a depth switch. Once activated, the samplers automatically collect samples at timed intervals at each site.

The bottles in each sampler will be prelabeled and numbered to correspond to each monitoring site. Each time a sample is taken, three 475 ml bottles will be filled to yield a total sample of 1400 ml volume.

The first storm event will be sampled discretely to observe the variability of pollutant concentration. It is anticipated that about eight samples will be collected for this first storm event at each monitoring site in order to adequately sample the first flush and subsequent hydrograph. Sampling of the first storm event will be completed once 8 samples have been

obtained. Parameters to be analyzed include: total and fecal coliform bacteria, BOD, and suspended solids. Sample volume will be saved and preserved so that certain other parameters can be analyzed at a later date if warranted.

The results of the first storm discrete sampling will be reviewed by Metcalf & Eddy to evaluate the within-storm variability of various pollutants. A decision will then be made as to whether discrete samples should be collected for subsequent sampling events. For parameters which reflect little variation in concentration, only one composite sample will be collected for subsequent storms.

Once several sample intervals have passed, Scan-N-Seals two crews will begin to collect samples from each automatic sampler. Each crew will be responsible for 5 sample sites. At each site, samples will be removed, bottles capped, chain of custody forms completed as to time of sample collection, and samples transferred to a cooler and iced to 4°C. Once 10 samples have been accumulated by a crew, Scan-N-Seal will transfer the samples to Metcalf & Eddy crew members at a predetermined central staging area for delivery to the laboratory. Scan-N-Seal will coordinate the collection of samples from each monitoring station in order to insure delivery to the laboratory within six hours of collection as required by EPA holding time criteria. All sample containers will be kept on ice at all times prior to delivery to the laboratory.

Flow Monitoring Data Transference. Following each storm event, Scan-N-Seal will collect the recorded CSO flow data from each flowlogger. These data will then be transferred to Metcalf & Eddy as follows: Metcalf & Eddy will supply a portable personal computer when requested; Scan-N-Seal will provide floppy diskettes and upload the data from the portable DLP-2 interrogator onto the floppy diskettes. A copy of the data analysis software will also be provided to Metcalf & Eddy for use during data analysis and reduction.

Storm Event Frequency. Once a storm event has occurred, a 7 day delay is required to prepare for the next sampling event. This 7 day period will be used to complete laboratory analyses on the first samples and to perform equipment maintenance. If a storm occurs during this period, flow and rainfall data will be collected, if possible.

Laboratory Procedures

Sample Custody. Prior to the first storm event, all bottles for each automatic sampler will be thoroughly cleaned, labeled and numbered with a sample identification number. Each batch of three 475 ml bottles will be assigned a sample number and a chain of custody form, such as that shown as Figure B-1, prepared for each site. Each of the three bottles will be designated as a sample fraction by the addition of the letters A, B, or C after the sample number. The time that the sample was collected will be recorded at the time of sample collection. Samples collected by field personnel will be submitted to the laboratory with the

METCALF & EDDY
Analytical Laboratory

Project:____________

Job#:____________

Date Collected

___/___/8__

CHAIN OF CUSTODY RECORD
AND LABORATORY WORK ORDER

Time Collected
(Start) | (End)
___:___ | ___:___
am/pm | am/pm

Collected by:____________________________ Transported by:____________________________

Received in Laboratory by:______________________ on ___/___/8__ at ___:___ am/pm

Sample Type: |Water|Marine|Wastewater|Industrial|Soil|Sludge|
Comments: Chlorine?

LN	SAMPLE IDENTIFICATION Field Description	Lab No.	Fraction Label	Rec'd Lab	Preservative/Pretreatment Required	**
--						
A						
B						
C						
D						
E						
F						
G						
H						
I						
J						

ANALYSES REQUIRED	METH.	SAMPLE NUMBER OR FRACTION									
Parameter	CODE	A	B	C	D	E	F	G	H	I	J

** Sampler's initials in this box means sample was preserved properly in field.

FIG. B-1 CHAIN OF CUSTODY RECORD FORM

TABLE B-3. ANALYTICAL TECHNIQUES

Parameter	Method No.	Description
$BOD_{(5)}$	405.1	Biochemical Oxygen Demand, Winkler titration
Total Non-filterable Residue	160.2	Suspended Solids
Total Coliform	pg. 108	Membrane Filter
Fecal Coliform	pg. 124	Membrane Filter

chain of custody form packed with the samples. Samples will be inspected upon delivery to the laboratory to assess condition, labeling, etc. Samples will be logged in and assigned laboratory identification numbers, and the original chain of custody form signed by the lab and returned to Metcalf & Eddy.

Analytical Procedures. The analytical procedures to be used by the laboratory are those given in Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, revised March 1983 and in Microbiological Methods for Monitoring the Environment, Water and Wastes, EPA-600/8-78-017. Table B-3 provides a summary of the techniques to be used.

Quality Control of Laboratory Analyses. In order to document variability of results due to field sample collection and laboratory analyses, the sample collection team will collect one duplicate sample from each sample site. The duplicate samples will be sent to the laboratory "blind" (the lab won't know it is analyzing sample duplicates) and the results used to

show the amount of variability encountered during the sampling and analysis procedures.

To assure accuracy of BOD results, the lab will analyze one Glucose-Glutamic acid BOD standard having a predetermined theoretical value. The standard will be analyzed along with actual samples and the result used to indicate laboratory accuracy.

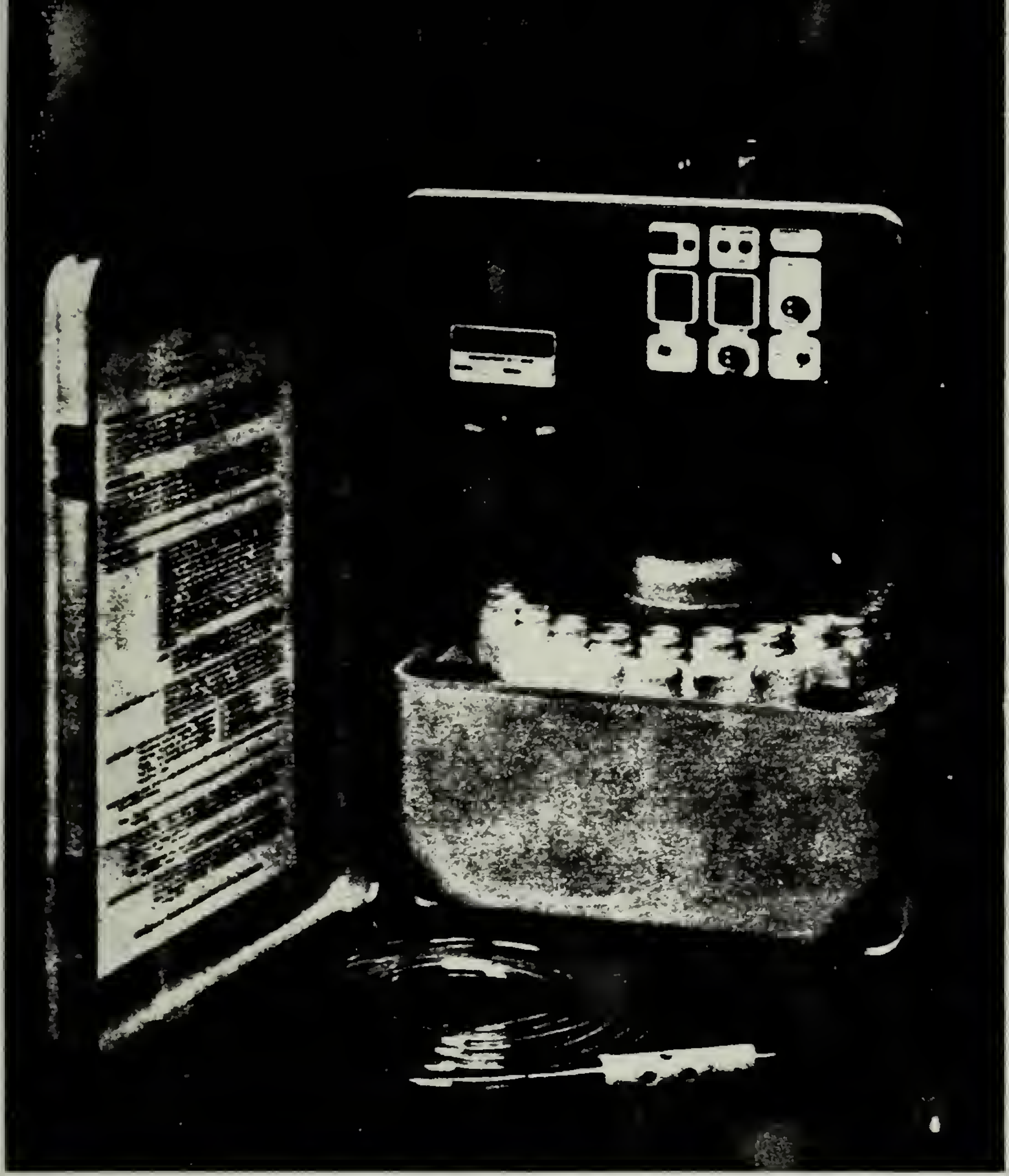
To document the potential presence of carry over bacteria contamination, sample blanks will be used. The sampling team will collect one field blank sample from each sample site sometime after the first actual sample is collected. Coliform-free water will be pumped through the sampling equipment and collected in a manner identical to samples. These field blanks will be analyzed "blind" by the lab and the results used to indicate levels of cross-contamination encountered in the actual samples.

The accuracy of coliform colony counts will be assessed through the use of the "double-count" technique by the lab. At least 8 total and fecal coliform plates will be counted twice by 2 different analysts and both counts reported individually to allow comparison.

In addition to the "blind" samples that will be analyzed, the laboratory will include known duplicates during analysis of suspended solids. These known duplicates will allow a measure of the laboratory variability apart from the influence of the actual sample collection process.

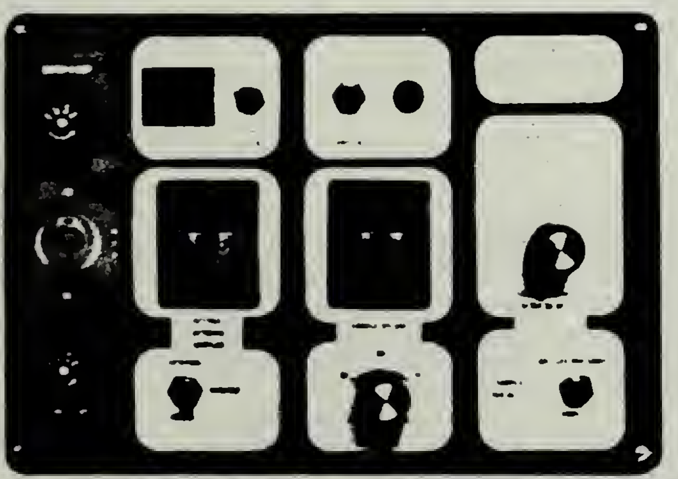
APPENDIX C

EQUIPMENT LITERATURE



6201

Model 6201 Portable 24 Bottle/Composite Sampler



Timer/Controller Panel

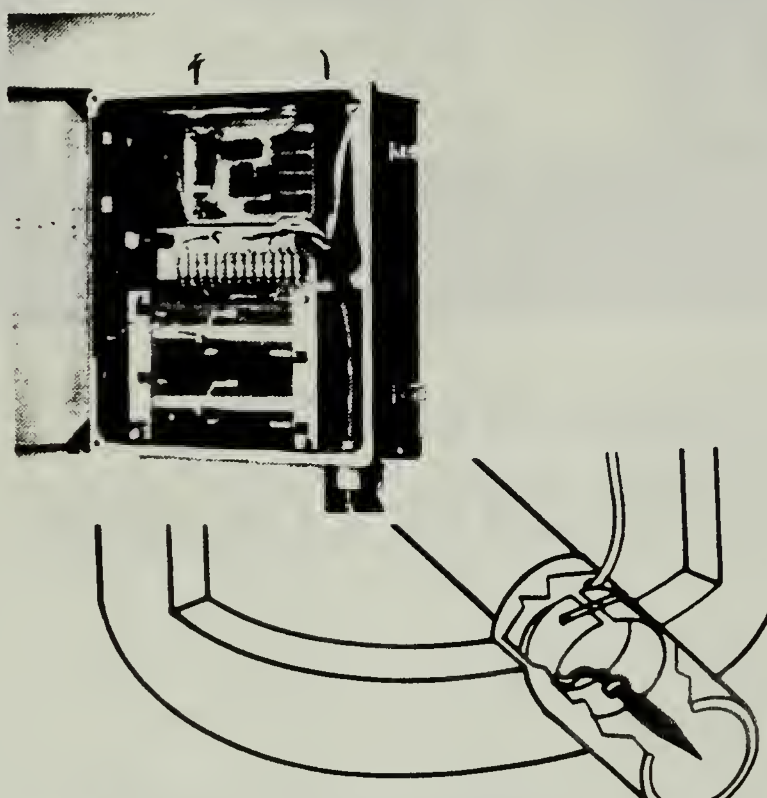
24 Bottle Tray with Lid

Sampler Suspended

AMERICAN **SIGMA**

- **Peristaltic Sample Pump**...no pump parts contact waste
- **26′ Lifts**...representative 2-3 ft/sec intake velocities
- **¼″ or ⅜″ I.D. Suction Line**...teflon/stainless strainer
- **Adjustable Pre- & Post-Sample Purge**
- **Timed Cycle & Flow Proportional**
- **24 Bottle/Composite**...(24) 475 ml bottles & (1) 2½ Gal.* Composite Container
- **110 VAC or 12 VDC**...6 amp-hr sealed gel battery*
- **Automatic Battery Takeover with AC Power Failure**
- **Programmable Sample Interval**
- **Adjustable Sample Volume**...±5% reproducibility
- **1-99 Hour Sample Program Delay**
- **Digital LED Display Indicates Stage of Sample Program**
- **Multiplex**...1-8 samples per bottle or 1-8 samples each interval
- **Automatic Shut-off**...after 24 advances of distributor tube
- **Sealed Electronic & Mechanical Components**

*Optional



TYPICAL INSTALLATION

DLP-2 INTERROGATOR/REPORTER

The DLP-2 is a solid-state 2-80 based hand held computer interrogator. The SLP-2 is designed expressly for field use, is waterproof and submersible, is battery operated and weighs 2.5 lbs. Only one DLP-2 is required to interrogate any number of Flowloggers™ or other SYSTEM 8™ instruments. The DLP-2 interrogator is supplied with data acquisition software, has storage in RAM for up to 99 instruments (208K RAM) and is furnished complete with graphics, extended BASIC language, CP/M operating system, full keyboard, 8 x 40 character LCD screen, sound capability, realtime clock, and RS-232-C I/O serial data port with connecting cable. The DLP-2 may be used as a solid state interrogator with DATAMATE™ software, or as a stand-alone reporter with optional dot-matrix printer. The DLP-2 is completely menu-driven for ease in operation.

DATAMATE™ SOFTWARE

DATAMATE™ is an integrated and powerful software package designed to provide a complete data acquisition, reduction, and analysis system for users of Montedoro-Whitney SYSTEM 8™ monitors. DATAMATE™ provides utilities for: interrogator emulation; communication; file management; data storage; data analysis; data reduction; report generation and graphics. DATAMATE™ can provide dial-up telemetry, or real-time hard-wired, or lease-line, or radio telemetry for complete SYSTEM 8™ integration. DATAMATE™ interfaces with other commercially available software packages such as WordStar™ and dBASE II™ and any software which uses standard Data Interchange Format.

SPECIFICATIONS:

WDFM-8 TRANSDUCER:

HOUSING:	STREAMLINED, POLYURETHANE-ENCAPSULATED COMBINATION PROBE
DEPTH	
RANGE:	0-10 FEET
ACCURACY:	± 0.25% FULL SCALE
RESOLUTION:	0.01 FOOT
OVERRANGE PROTECTION	2 X FULL SCALE
VELOCITY	
RANGE:	− 20 TO + 20 F/S
ACCURACY:	± 2%
FLOW ACCURACY:	± 3%
TEMPERATURE RANGE:	32°F TO 104°F WATER TEMPERATURE
OTHER SENSORS:	0 TO ± f VDC

OTHER SENSORS:

Flowlogger™ accepts any 0 to ± 5 VDC linear analog input. Consult factory for specific requirements.

FLOWLOGGER™:

ENCLOSURE:	NEMA 6P SUBMERSIBLE
DIMENSIONS:	14″ H. X 12″ W. X 6½″ D.
TEMPERATURE RANGE:	− 20°F TO 140°F AMBIENT
HUMIDITY (MAXIMUM):	100% CONDENSING
MEMORY CAPACITY:	16K (EXPANDABLE TO 32K) RAM
INPUT CHANNELS:	6 ADDITIONAL
STORAGE FORMAT:	PACKED BCD
DATA RESOLUTION:	12 BIT FROM 0000 TO ± 4095
LOGGING INTERVAL:	1, 2, 5, 15, 30, 60 MINUTES, 2, 6, 12, 24 HOURS
OUTPUT:	RS-232-C SERIAL DATA PORT
INTERNAL BATTERY:	RECHARGEABLE SEALED LEAD-ACID GEL CELL. SINGLE BATTERY PACK STANDARD. SECOND BATTERY PACK OPTIONAL.

NOTE: BATTERY CHANGE MAY BE ACCOMPLISHED WITHOUT DISTURBING DATA COLLECTION FUNCTIONS OR REPROGRAMMING.

BATTERY LIFE:	2 MONTHS PER BATTERY @ 30 MINUTE INTERVAL

OTHER SYSTEM 8™ INSTRUMENTS: WDM-8, WDM-1, WFM-⅓, IFM-1, MARK 27, MARK II, POM-1

Montedoro-Whitney
The leader in water instrumentation
2741E McMillan Road, San Luis Obispo, CA 93401
Toll-free: 800/235-4104
(In Calif. 805/543-1233)

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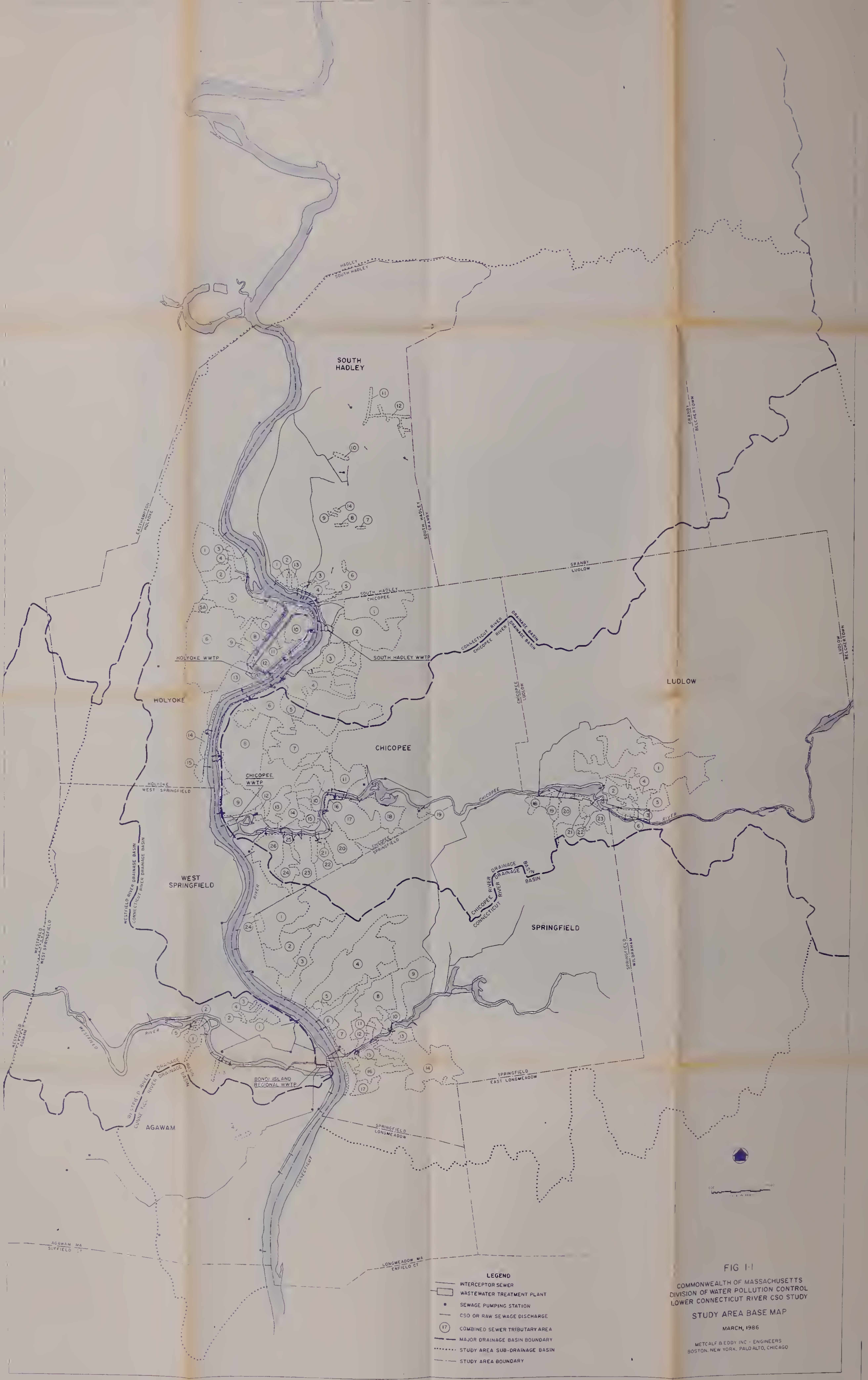

FIG 1-1

COMMONWEALTH OF MASSACHUSETTS
DIVISION OF WATER POLLUTION CONTROL
LOWER CONNECTICUT RIVER CSO STUDY

STUDY AREA BASE MAP

MARCH, 1986

METCALF & EDDY INC · ENGINEERS
BOSTON, NEW YORK, PALO ALTO, CHICAGO